Puerto Rico

Correspondence
XR Proposal

PROPOSAL

OFFICE AND MANUFACTURING FACILITY

for

DIGITAL EQUIPMENT CORPORATION
PUERTO RICO

PROPOSAL

Puerto Rico

Correspondence
XR Proposals

CUNNINGHAM-LIMP COMPANY

CUNNINGHAM-LIMP INTERNATIONAL · CUNNINGHAM-LIMP LIMITED
CUNNINGHAM ENGINEERS INC.

DESIGNERS ★ ENGINEERS ★ BUILDERS

OFFICES IN PRINCIPAL CITIES
680 FIFTH AVENUE - NEW YORK, N.Y. 10019 ★ AREA CODE 212 ★ 757-6510

PROPOSAL NO. N-8978
January 26, 1973

Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Attention: Mr. Allen W. Hanson
Corporate Facilities Manager

Re: Office and Manufacturing Facility
Puerto Rico

Gentlemen:

Thank you for the courtesies extended to us at our recent meeting and for the opportunity to discuss your proposed building program in Puerto Rico.

Based upon the information obtained during our meeting, our proposal is presented in a manner that will offer a logical and orderly sequence. It provides a clear definition of scope and cost, together with responsibility both during the planning and execution stages. We suggest that the work be performed in two (2) phases.

The scope of work is specifically defined in the attached Schedule of Work. As the study portion of the program nears completion, we will prepare preliminary drawings and outline specifications, and a budget cost estimate for the project. Any necessary revisions to scope and costs can be made at this time.

Upon determining the extent of the final project and with your approval, we will proceed with Phase II - to order long delivery items, prepare detailed architectural and engineering working drawings and specifications and begin field construction work. When sufficient working drawings and specifications are available, we will obtain competitive bids on all major subcontract work and material purchases. Based upon these bids, we will prepare a "Guaranteed Maximum Amount" for insertion into a mutually acceptable contract.

We will assign a group of engineers and a project manager to immediately begin gathering and analyzing all pertinent data available from DEC and to develop the required utilities, building layout and supporting facilities, such as waste treatment.

The work performed under Phase I will be billed to you at the rate of Sixteen Dollars and Fifty Cents ($16.50) per technical man-hour plus out-of-pocket expenses. We estimate the cost of Phase I will be approximately Fifty to Sixty Thousand Dollars ($50,000-$60,000).

We have included a tentative schedule indicating the time required to complete each step of the overall project to meet your desired target date. The schedule indicates authorization to proceed with Phase I on February 1, 1973 and concludes with completion of the structure and turnover to you on April 1, 1974.

As per your request, the following references are submitted for your convenience:

BORDEN de PUERTO RICO, INC.
G.P.O. 4265
San Juan, Puerto Rico 00936

Mr. Fred L. Kurr, Jr.
Telephone: (809) 787-4050

XEROX CORPORATION
High Ridge Industrial Park
Stamford, Connecticut 06904

Mr. Robert H. Goodenow
Manager, Facilities Project Management
Telephone: (203) 329-8711

AMP Incorporated
P. O. Box 3608
Harrisburg, Pennsylvania 17105

Mr. Dale E. Lockard
Manager of Facility Services
Telephone: (717) 564-0101

An authorized signature in the space provided and the return of two (2) signed copies will authorize us to proceed with the work under Phase I.

Digital Equipment Corporation
Maynard, Massachusetts 01754

PROPOSAL NO. N-8978
January 26, 1973

We appreciate the opportunity to present this proposal and look forward to assisting you in the planning and execution of your expansion program.

Very truly yours,

CUNNINGHAM-LIMP COMPANY

Roy R. McPherson
District Sales Manager

Authorized and Accepted

DIGITAL EQUIPMENT CORPORATION

By_____

Date_____

RRMcP:dd

SCHEDULE OF WORK

PHASE I - FACILITIES PLANNING

Builder shall provide engineering services to assist the Owner in the development of a modern circuit board manufacturing facility. This facility is to be located on a new site selected by Owner in Aguadilla, which is in the Western part of Puerto Rico. The initial phase of the facility will be approximately 130,000 square feet.

The scope of work to be performed shall include the following:

1. A comprehensive in-plant review of existing operations to become familiar with materials, machinery and equipment, manufacturing processes, products, material flow, materials handling methods, warehousing procedures, service and office space requirements.

2. Consultation with Owner and his appointed representatives to ascertain product volume, production methods, product mix and storage quantities. Review in detail information already prepared by Owner.

3. Detailed equipment schedule tabulating all machinery and equipment and listing all mechanical, electrical and process utility requirements and special physical characteristics such as pits, foundations and superimposed frame loadings.

4. Development of flow diagrams to correlate all operations from receiving, raw material storage, through processing to finished goods storage and shipping.

5. An area analysis to determine departmental space requirements to accomodate anticipated production levels and attendant service functions.

6. Development of block layouts showing proposed departmental areas, configurations and relationships.

7. A study to develop functional, efficient and economical systems for materials handling and material storage throughout the facility.

8. A site utilization plan (developed for the selected site) showing building, access roadways, rail facilities, if required, parking facilities, truck facilities, outside services, and future expansion areas, main utility services and drainage.

9. Preparation of preliminary room finishes, materials of construction, and mechanical, electrical and process design criteria to meet the requirement of Owner's process and applicable codes such as O.S.H.A.

PHASE I - FACILITIES PLANNING (CONT'D.)

10. Preparation of preliminary architectural drawings including floor plans and elevations, and outline specifications.

11. A budget estimate of costs for Designing, Engineering and Building the proposed facility including:

    a. Land site development with utilities

    b. Building and building services

    c. Process services

    d. Relocation and hook-up of existing machinery and equipment.

    e. Renovation of existing equipment and machinery

    f. Cost for new machinery and equipment including installation will be furnished by the Owner.

    g. Materials handling systems.

    h. Operating and maintenance costs for the proposed new facility.

12. A realistic construction schedule.

13. A colored architectural rendering of the proposed facility.

14. A complete written report of the findings with conclusions and recommendations and including all supporting data, such as drawings, charts, graphs, tables and exhibits.

PHASE II - DESIGNING, ENGINEERING AND CONSTRUCTION

Upon completion of Phase I and authorization by the Owner to proceed with Phase II, Builder shall:

1. Provide sufficient working drawings and specifications to obtain competitive bids on all major sub-contract work and material purchases. Prepare a "Guaranteed Maximum Amount" for a mutually acceptable contract.

2. Complete all architectural and engineering working drawings and specifications required for the construction of the facilities. These drawings and specifications will include site, architectural, structural, mechanical, electrical and process.

PHASE II - DESIGNING, ENGINEERING AND CONSTRUCTION (CONT'D.)

3. Construct all facilities, as defined by the drawings and specifications herein described and approved by the Owner.

4. Provide Owner with "as-built" drawings.

SCHEDULE

CUNNINGHAM-LIMP COMPANY

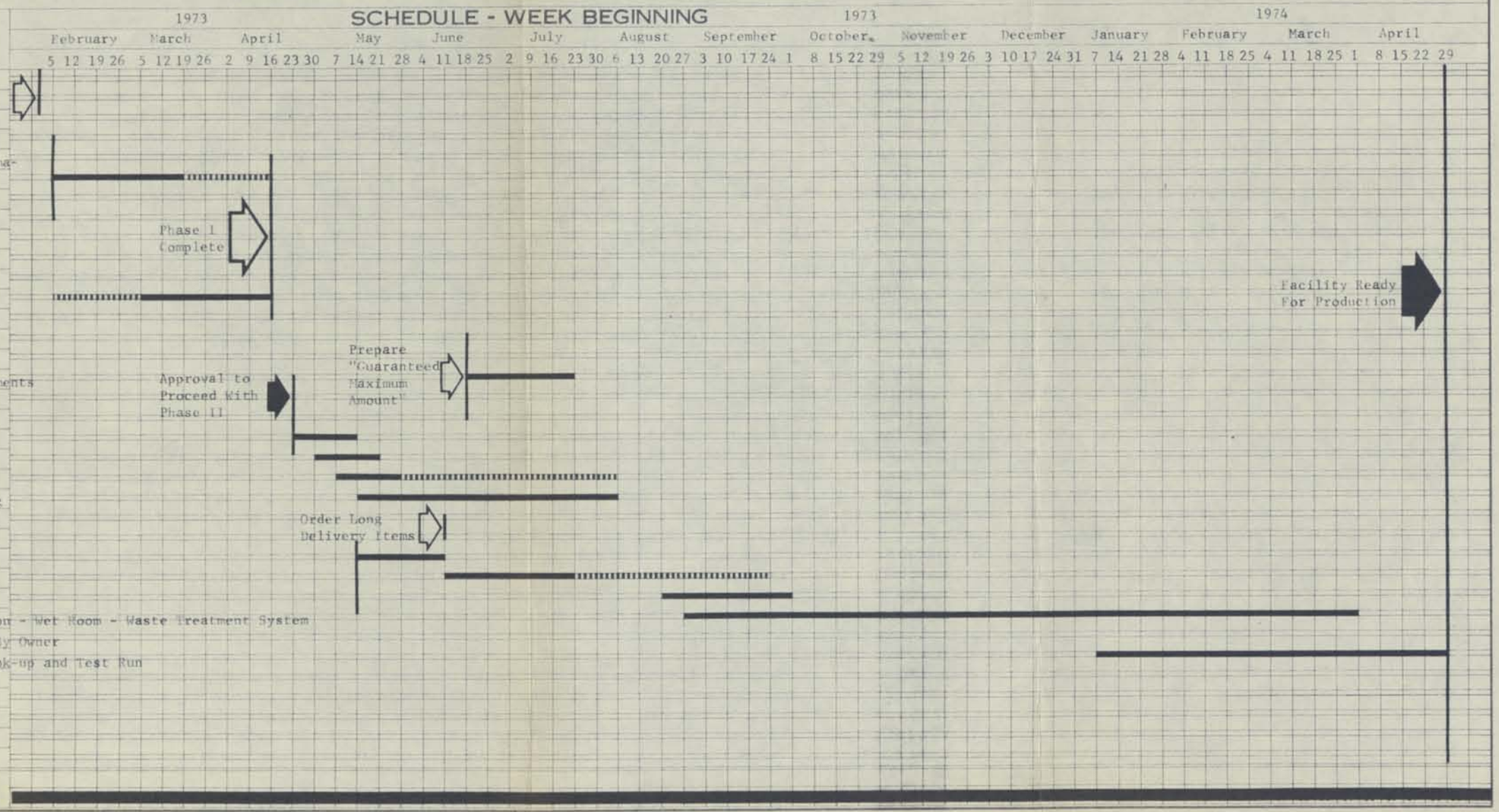
CUNNINGHAM-LIMP INTERNATIONAL ★ CUNNINGHAM-LIMP LIMITED
CUNNINGHAM ENGINEERS, INC.
DESIGNERS ★ ENGINEERS ★ BUILDERS

PROJECT NO. 83016-01

ESTIMATED TIME

OFFICE AND MANUFACTURING FACILITY
DIGITAL EQUIPMENT CORPORATION
AGUADILLA PUERTO RICO

SCHEDULE - WEEK BEGINNING



PROJECT NO. 83016-01

FINAL
ENVIRONMENTAL IMPACT STATEMENT FOR THE DIGITAL EQUIPMENT CORPORATION PLANT AT AGUADILLA, PUERTO RICO

DECEMBER 1973

R. M. GUZMAN & ASSOCIATES
Consulting Sanitary Engineers
San Juan, Puerto Rico

FINAL
ENVIRONMENTAL IMPACT STATEMENT FOR THE
DIGITAL EQUIPMENT CORPORATION PLANT
AT AGUADILLA, PUERTO RICO

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COMMONWEALTH OF PUERTO RICO
ECONOMIC DEVELOPMENT ADMINISTRATION
RESEARCH & DEVELOPMENT DEPARTMENT
G. P. O. BOX 3088
SAN JUAN, PUERTO RICO – 00936

SUMMARY OF FINAL ENVIRONMENTAL IMPACT STATEMENT

Digital Equipment Corporation de Puerto Rico
Aguadilla, Puerto Rico

This Final Environmental Impact Statement (EIS) has been prepared following the recommendations of the Environmental Quality Board. The report consists of two sections. The first section, inmediately after this summary, cover the responses to the comments and endorsements made by the reviewing agencies. The second section, presents the revised Draft Environmental Impact Statement.

1. Class of Action: Administrative

2. Description of Action:

Digital Equipment Corporation de Puerto Rico is planning to construct a plant in Aguadilla to produce sophisticated modular systems and other electronic equipment. The site is located in Bo. Montana near Ramey Air Force Base. It is a 55 cuerdas farm close to P.R. Rds. 459 and 467. The plant will provide employment to about 600 people at the start of operations. It will be the second plant to be established by Digital in Puerto Rico. This facility to

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be established at Aguadilla will represent a total capital investment of about $6 million. Annual expenditures of raw materials, packing materials, maintenance supplies, etc. are estimated at $4 - 6 millions

The basic products to be manufactured are modulars systems including circuit boards, etched circuits and subassemblies. The proposed facilities will consist of 130,000 sq. ft. of floor space which will harbor the administration offices and the manufacturing plant.

The principal process to be used for the etched circuits boards and the plating through holes circuit boards is divided into the following main operations.

- Pre-clean, where a wet abrasive deburr is used on the metal which is then rinsed and the water cascade passed through an effluent filter.
- Plating - Through Hole: a process which consists of nine (9) distinct operations, during which the circuit boards are cleaned and plated with copper, tin-lead, nickel and gold.

3. Summary of Environmental Impact:

3.1 Effects on Air Quality

3.1.1 Fire tube boiler. This small boiler not in excess of 400 horsepower, will burn 70 gal/hr. of kerosene with

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a 0.5 wt. percent of sulfur. It will generate a maximum of 7 tons per year of sulfur dioxide. The vent stack will have 24 in. diameter and 200 ft. height.

3.1.2 Minor Inorganic Vapors:

These small quantities of vapors will be handle by a proper ventilation system and high efficiency scrubbers.

3.1.3 Fugitive dust during construction

3.2 Effects on Undergroung Water and Nearby Ocean

3.2.1 Discharge of process and domestic wastewater: both process and domestics wastewaters will be discharged in a natural sinkhole in the plant premices after treatment. The domestic wastewaters will be treated in a package activated sludge treatment plant with 90 - 95% BOD reduction. An integrated treatment plant will take care of the process wastes to remove the inorganic materials present. Digital Equipment Co. will handle dye test to determine the probable flour of the process wastes once it is discharged into the sinkhole, as soon as water supply become available. These tests will be conducted to determine if the wastewater may contaminate the ground waters, if any, or the nearby ocean. It is anticipated that for the

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first year of operations the process will probably be a "dry" one with only domestic wastes discharging into the sinkhole. During this year all the necessary tests regarding the process waste flow would be made.

3.2.2 Metallic Ions Present in Process Wastewaters: there will be only traces of metallic ions in the process wastes after treatment. The quantities present will comply with effluent guidelines recommended by E.P.A. for this type of industry.

3.3 Socio-Economic

3.3.1 Employment for about 1,000 persons in a region with 29.3 percent unemployment.

3.3.2 $3 million annual estimated payroll

4. Alternatives:

4.1 Alternatives Sites

4.1.1 Aguadilla Area

4.1.2 Ponce - Guayanilla Area

4.1.3 San Germán Area

4.1.4 Mayaguez - Añasco Area

4.1.5 Barceloneta Industrial Park

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ECONOMIC DEVELOPMENT ADMINISTRATION
RESEARCH & DEVELOPMENT DEPARTMENT
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4.2 Alternatives considered for Disposal of Wastewaters

4.2.1 Sink-Hole on plant premices

4.2.2 Aguadilla Regional System

4.2.3 Ramey A.F.B. biofiltration plant

4.2.4 Quebrada de los Cerdos

4.2.5 Septic Tank with Tile Field

4.3 Alternatives considered as Water Supply Sources

4.3.1 From Aguadilla Filtration Plant

4.3.2 From Ramey A.F.B. Filtration Plant

4.3.3 From Aguadilla Irrigation System

4.3.4 From Deep Wells

5. Commenting Agencies:

Written comments have been received from the following state and Local Agencies:

- Municipality of Aguadilla
- P.R. Department of Health
- P.R. Department of Labor
- P.R. Aqueduct and Sewers Authority
- P.R. Department of Natural Resources
- Environmental Quality Board

COMMONWEALTH OF PUERTO RICO
ECONOMIC DEVELOPMENT ADMINISTRATION
RESEARCH & DEVELOPMENT DEPARTMENT
G. P. O. BOX 3088
SAN JUAN, PUERTO RICO - 00936

6. This Final Environmental Impact Statement was made available to the Environmental Quality Board on_____.

7. The Official responsible for the issuance of this statement is:

Mr. Gerardo E. Maldonado
Director
Research and Development Department
G. P. O. Box 3088
San Juan, Puerto Rico 00936

Telephone: 767-9191

COVER LETTER OF SPONSORING AGENCY AND

GOVERNMENT AGENCIES' LETTERS OF COMMENTS

COMMONWEALTH OF PUERTO RICO
ECONOMIC DEVELOPMENT ADMINISTRATION
INDUSTRIAL RESEARCH
G. P. O. BOX 3088
SAN JUAN, PUERTO RICO - 00936

10 de octubre de 1973

Ing. Ramón M. Guzmán
Calle Monserrate 560
Parada 15
Santurce, Puerto Rico

Asunto: DIA - Digital Equipment Corp.
Aguadilla, Puerto Rico

Estimado Guzmán:

Los comentarios de las agencias consultadas han sido recibidos y por lo tanto, el proceso consultivo a que fuera sometida la DIA de referencia ha terminado. Sólo resta analizarlos e incluirlos en la DIA final requerida para el proyecto.

Las agencias más abajo enumeradas comentaron sobre la propuesta, se incluye copia de sus comentarios:

1. Municipio de Aguadilla
2. Departamento de Salud
3. Departamento del Trabajo
4. Autoridad de Acueductos
5. Departamento de Recursos Naturales
6. Junta de Calidad Ambiental

Estamos a tus órdenes para discutir dichos comentarios cuando lo estimes conveniente.

Cordialmente,

Carlos R. Guerra

Anexo

Estado Libre Asociado de Puerto Rico
Gobierno Municipal
Apartado 278 - Tel. 891-1005 Ext. 16
Aguadilla, Puerto Rico - 00603

Conchita Igartúa de Suárez
Alcaldesa

14 de agosto de 1973

Sr. Gerardo E. Maldonado, Director
Administración de Fomento Económico
Investigaciones Industriales
Apartado G. P. O. 3088
San Juan, Puerto Rico 00936

Estimado señor Director:

Acuso recibo y agradezco la copia del documento en epígrafe enviada para nuestro conocimiento del proyecto e invitación para emitir comentarios y/o recomendaciones sobre el mismo.

Hemos evaluado el proyecto a la luz de nuestra responsabilidad como alcaldesa y como ciudadana de Aguadilla, y considero que el estudio llevado a cabo por la firma Guzmán & Associates es uno concienzudo y extenso. Expone claramente y profesicnalmente las ventajas para la localización de la Planta Digital en el barrio Montaña de Aguadilla, y el impacto económico a los problemas del desempleo crónico en nuestra ciudad.

Deseo testimoniar a la Administración de Fomento Económico nuestro más decidido endoso y respaldo a este proyecto, que indudablemente llevará un cometido en beneficio del progreso de Aguadilla.

Cordialmente,

CONCHITA IGARTUA DE SUAREZ
ALCALDESA

CIS/bmb

c.c/ Departamento de Investigación y Desarrollo (3)
Junta de Calidad Ambiental (3)

ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DE SALUD
SAN JUAN, PUERTO RICO - 00908

17 de agosto de 1973

Ing. Carlos R. Guerra
Departamento de Investigación
y Desarrollo - G.P.O. Box 3088
San Juan, Puerto Rico 00936

Re: D.I.A.-preliminar Digital
Equipment Corp. de P.R.
Aguadilla, Puerto Rico

Estimado Ing. Guerra:

Luego del estudio realizado por nuestro personal técnico, desde el punto de vista de la Salud Ambiental, no tenemos objeción al proyecto industrial propuesto, siempre y cuando el mismo se desarrolle de acuerdo a la declaración sometida a nuestra atención.

No obstante, nos permitimos comentar lo siguiente:

La declaración no indica la altura de la chimenea a instalarse para disponer los gases de combustión de la caldera. Debe tenerse en cuenta futuros establecimientos en el área.

No se indica el tipo de receptáculos a utilizarse para almacenar los desperdicios sólidos.

No se indica el lugar donde se hará la disposición final de los desperdicios sólidos a generarse.

La descarga de desperdicios inorgánicos a un sumidero, según propuesta, debe ser considerada y aprobada por la Junta de Calidad Ambiental.

Cordialmente,

Dr. Víctor A. González
Secretario Auxiliar
Salud Ambiental y
Protección al Consumidor

CARLOS D. GUERRA

ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DEL TRABAJO
AVENIDA BARBOSA 414
HATO REY, P. R. 00917

OFICINA DEL
SECRETARIO DEL TRABAJO

21 de agosto de 1973

Sr. Gerardo E. Maldonado
Director
Investigaciones Industriales
Administración de Fomento Económico
Apartado 3088
San Juan, Puerto Rico 00936

Estimado señor Maldonado:

Me refiero a su comunicación del 19 de julio del corriente, sometiendo para el estudio y evaluación de este Departamento la Declaración de Impacto Ambiental (DIA) preliminar de la empresa Digital Equipment Corporation de Puerto Rico, a localizarse en Aguadilla, Puerto Rico, para la manufactura de equipo electrónico y sistemas modulares.

Deseo informarle que en el proceso de galvanoplastia existe la posibilidad de riesgos de enfermedades ocupacionales debido a la presencia de emanaciones o vapores de compuestos inorgánicos y orgánicos y por lo tanto se recomiendan las siguientes medidas de control:

1. El uso de un sistema de ventilación por aspiración local para remover las emanaciones de las substancias contaminantes en cada uno de los tanques de electrodeposición de cromio.

2. Ventilación general suficientemente en el área de trabajo.

3. Proveer equipo de protección personal: guantes, delantares, lavabo de ojos, ducha de seguridad, viceras de cara o gafas de seguridad, zapatos o botas de goma.

4. Se deben realizar en forma periódica exámenes médicos apropiados a los riesgos potenciales que conllevan las operaciones.

5. En aquellas áreas de la fábrica donde se utilicen líquidos flamables deberán seguirse estrictamente las normas de seguridad establecidas.

Espero que estos comentarios le sean de utilidad.

Cordialmente,

Rubén A. Vilches
Secretario Auxiliar a Cargo del
Area de Normas y Servicios
Directos

29 de agosto de 1973

Ing. Carlos R. Guerra
Depto. de Investigación y Desarrollo
Administración de Fomento Económico
Apartado 3088
San Juan, Puerto Rico 00986

Asunto: Comentario a la DIA del Proyecto "Digital Equipment Corporation de Puerto Rico" en Aguadilla.

Estimado ingeniero Guerra:

Hago referencia a su carta del 19 de julio de 1973 en la cual se solicitan nuestros comentarios a la DIA del proyecto que se describe en el epígrafe.

En relación con el suministro de agua potable por el sistema de Aguadilla, la DIA final debe contener un plano indicando el sitio de conexión en la planta. Debe además indicar el efecto de esta demanda en la capacidad de la planta de filtros y fuente de abasto.

Para la disposición de desechos industriales, la corporación propone la descarga en una cavidad natural del suelo luego de haber recibido tratamiento. Este sistema presenta el riesgo de la contaminación de fuentes de agua subterráneas, aún cuando entendemos que éste pueda ser mínimo debido a su localización cerca del mar.

Por otro lado, la Autoridad de Acueductos tiene proyectado un sistema de tratamiento y disposición para

aguas usadas y desechos industriales, en la región de Aguadilla. La compañía debe establecer coordinación con esta Agencia, para poder integrarse a este sistema, tan pronto entre en operación.

Cordialmente,

Alvah R. Pierce
Director Area Planificación

Estado Libre Asociado de Puerto Rico
DEPARTAMENTO DE RECURSOS NATURALES
Apartado 5887 - Puerta de Tierra, Puerto Rico - 00906

Dirija toda comunicación oficial al
SECRETARIO DE RECURSOS NATURALES

Número RHF-lmr
Sírvase mencionar este número
cuando se refiera a este asunto

28 de septiembre de 1973

Sr. Gerardo E. Maldonado
Director
Departamento de Investigación
y Desarrollo
Administración de Fomento Económico
Apartado 3088
San Juan, Puerto Rico

Asunto: DIA Digital Equipment
Corporation, Aguadilla
Sol. Núm. 73-0 (8)-0267
773-044 ADM

Estimado señor Maldonado:

Luego de estudiarse la Declaración de Impacto Ambiental en epígrafe, este Departamento de Recursos Naturales tiene las siguientes recomendaciones que hacer con relación al proyecto:

1. La quebrada Los Cedros no deberá ser depositaria de ningún tipo de efluente o desperdicios producidos en el proyecto. Este cuerpo de agua tiene muy poco caudal y su desembocadura está tapada la mayor parte del tiempo lo que traería por consecuencia acumulaciones de desperdicios detrimentales al valor de la quebrada como recurso natural. De las alternativas propuestas para la disposición de los desperdicios creemos que la más aceptable es la que propone pasarlos al sistema sanitario de Aguadilla. El uso del sumidero para tales propósitos puede confligir con la calidad del acuífero pues la transmisibilidad de estas áreas es muy alta.

2. Se deberá guardar para uso público una distancia de 5 metros a los lados de la quebrada. La distancia se medirá desde los bordes de la misma.

3. En la DIA final los proponentes deberán presentar los resultados de las pruebas de tintes para asegurarnos de que los efluentes no afectarán los acuíferos del lugar ni de que habrán de llegar al mar.

4. En caso de que fuera necesario obtener agua mediante el hincado de pozos, los proponentes deberán solicitar un permiso a tales efectos de este Departamento. Esta solicitud será evaluada por sus propios méritos.

Queremos llamar la atención hacia el hecho de que cuando nuestros técnicos visitaron este lugar encontraron que ya se estaba nivelando el terreno para el proyecto.

Cordialmente,

Cruz A. Matos
Secretario

cc: Junta de Calidad Ambiental
Sr. Pedro F. Tirado

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DEL GOBERNADOR Pág. 1 de 6

Junta de Calidad Ambiental

26 de septiembre de 1973

Sr. Gerardo Maldonado, Director
Investigaciones Industriales
Administración de Fomento Económico
Apartado G. P. O. 3088
San Juan, P. R. 00936

DIA Núm: JCA 73-027 (AFE)

Asunto: Planta para la elaboración de equipo electrónico Digital Corporation de P. R. Aguadilla, P. R.

Fecha de recibo: 31 de julio de 1973

Estimados señores:

De acuerdo con el artículo 4(2)(C) de la Ley Sobre Política Pública Ambiental de Puerto Rico, esta Junta ha revisado la Declaración Preliminar de Impacto Ambiental (DIA) que ustedes prepararon para el caso de epígrafe, así como los comentarios de:

Departamento del Trabajo
Departamento de Salud
Municipio de Aguadilla
Autoridad de Acueductos y Alcantarillados

En relación con este asunto, deseamos recordar a ustedes lo siguiente:

1 - Proyectos Federales. Si esta DIA preliminar va a ser usada por una agencia federal, de acuerdo con la Sección 102(2)(C) de la Ley Federal Sobre Política Pública Ambiental, ustedes son responsables de enviar copias a dicha agencia federal.

2 - DIA Final. Si ustedes preparan una DIA final, favor de asegurarse de que la JCA reciba una copia.

3 - Permisos. Esta carta no es un permiso. Si se requiere algún permiso en este caso, bien sea por reglamentos de la JCA o por cualesquiera otras leyes o reglamentos, ustedes son responsables por la radicación de las solicitudes para dichos permisos.

A base de la información contenida en la DIA preliminar sometida por ustedes, encontramos que aplica la estipulación marcada con una "X" a continuación.

[X] 1 - Consideramos que la acción propuesta afecta significativamente el ambiente. Por consiguiente, antes de tomar alguna acción administrativa descrita en esta DIA preliminar, deberán ustedes radicar una DIA final y observar el período de tiempo requerido para conocimiento del público y para comentarios, según detallado en las Guías de la Junta Sobre la Calidad Ambiental.

[ ] 2 - Consideramos que la acción propuesta no afecta significativamente el ambiente de acuerdo con el contenido del artículo 4(2)(C) y que, por consiguiente, no es necesario preparar una DIA final.

[ ] 3 - Consideramos que la DIA preliminar evalúa adecuadamente el impacto ambiental de la acción propuesta. No tenemos, pues, revisión alguna qué sugerir. Por lo tanto, nos proponemos considerar la DIA preliminar como una DIA final. A nuestro juicio, ustedes han cumplido con los requisitos del artículo 4(2)(C) para Declaraciones de Impacto Ambiental. Si están ustedes de acuerdo, favor de notificarnos por escrito para continuar con el procedimiento de la DIA final.

[ ] 4 - Nos es imposible determinar si la acción propuesta afectará o no significativamente el ambiente. Se necesita información adicional y la misma deberá suplirsenos según se indica en los comentarios de esta Junta que se detallan más adelante.

A continuación los comentarios de esta Junta, si algunos.

DIA-11
9-72

VER COMENTARIOS ADJUNTOS

Sr. Gerardo Maldonado
JCA 73-027(AFE)
página 2

La Junta de Calidad Ambiental (JCA) ha revisado la Declaración de Impacto Ambiental (DIA) del proyecto mencionado en el epígrafe. Creemos conveniente señalar que de acuerdo a la Ley #9 que establece la política pública ambiental del Estado Libre Asociado de Puerto Rico y al "Manual para la Preparación, Evaluación y Uso de las Declaraciones de Impacto Ambiental", toda agencia del gobierno que haya radicado una DIA preliminar deberá esperar las recomendaciones y los comentarios que la JCA, el público y las agencias interesadas emitirán al respecto, antes de proceder a iniciar acción alguna sobre el terreno. En el caso que nos ocupa al presente, aparentemente no se obró en la forma antes expuesta y se procedió a llevar a cabo las operaciones de preparación del terreno. A continuación nuestros comentarios.

Consideramos que la acción propuesta podría afectar significativamente el ambiente, por lo tanto, deberá radicarse una DIA final conteniendo la siguiente información:

1. Calidad de Agua

   A. Efluentes

      Deberá proporcionarse información más detallada sobre la planta de tratamiento propuesto incluyendo su eficiencia, tipo y ciclo de operación.

      En la página 26, último párrafo, se hace mención a una figura que muestra los flujos de los desperdicios en el proceso. Dicha figura no aparece en la DIA preliminar. Debe especificarse el volumen del efluente industrial, su procedencia y características, e indicar las concentraciones esperadas de cada componente.

      Los proponentes están considerando la posibilidad de descargar el efluente del proceso, luego de tratado, a un sumidero natural existente en los terrenos de la compañía mientras se termina de construir el sistema de tratamiento regional de Aguadilla. Este sumidero es una cueva profunda de dimensiones considerables. Considero que antes de usarse para estos propósitos se realicen estudios para determinar el destino final de esas aguas.

      La experiencia nos muestra que la práctica de descargar efluentes en sumideros y pozos es poco segura. En este caso no se sabe con certeza hacia donde fluyen las aguas que son depositadas en el sumidero propuesto. Es de vital importancia el que se efectúen una serie de pruebas con tintes para determinar el patrón de circulación.

Según indican los pozos de Bo. Montones, Bejuco y Guerrero, el nivel freático medido desde la superficie es 225 pies en Montones y 450 pies en Guerrero. Este nivel es cercano al nivel del mar en esas áreas, sin embargo, no ocurre intrusión de agua salada, lo que indica la presencia de un acuífero.

Basándonos en lo antes expuesto, la JCA no está de acuerdo con que se realize la descarga de aguas en el sumidero propuesto, hasta tanto se lleven a cabo las pruebas solicitadas y se demuestre que ésta operación no causará daños al ambiente.

Deberá someterse un compromiso escrito de acometerse al sistema regional tan pronto éste entre en función.

B. Fuente de Abasto

Se debe señalar definitivamente la alternativa seleccionada como fuente de agua para el proyecto. La sección del informe que trata este aspecto no está muy clara. De obtenerse el agua de la Autoridad de Acueductos y Alcantarillados, debe incluirse el acuerdo escrito al respecto.

Las necesidades inmediatas y futuras en cuanto al abasto de agua en términos de volúmenes, usos, procedencia y destino de éstas, deben incluirse en forma más detallada. De darlo algún tipo de pretratamiento a toda o parte del agua a usarse, deberá indicarse qué tipo va a aplicársele, el volumen de agua a ser tratada y otros detalles pertinentes.

Se menciona la posibilidad de recircular parte del agua usada en el proyecto. Debe indicarse qué parte y el tratamiento que se le va a aplicar para poder volver a usarla, dando detalles del mismo.

C. Medidas de Seguridad

Información a este respecto debe incluir:

1. Procedimiento a seguirse en caso de que ocurra un derrame de alguna substancia inorgánica en los terrenos de la fábrica.

2. Tratamiento a aplicársele a las aguas de escorrentío si éstas llegan a contaminarse; métodos preventivos.

3. Tratamiento a aplicársele a las sustancias que se derramen y que se van a recoger en un tanque provisto para este propósito.

4. Persona responsable en caso de ocurrir un derrame de alguna de las substancias usadas en el proceso fuera de la fábrica y el procedimiento a seguirse.

5. Medidas a tomarse para proteger el sumidero y evitar que pueda obstruirse parcialmente o taparse, alterando el desague natural del área.

D. Otros

El informe señala que está bajo estudio la posibilidad de usar un sistema de intercambio iónico. De éste usarse, deberán señalarse los procesos en los que se va a aplicar y el propósito específico.

Se indica que se va a usar un panel de decantación para separar el cieno que contiene hidróxidos de metales pesados del agua. Dicho panel tiene una membrana filtrante, a través de la cual pasa el líquido sobrenadante luego de que los cienos se sedimentan. No se indica qué método de disposición se va a utilizar para el sobrenadante.

II. Calidad de Aire

El proyecto bajo consideración tendrá como posibles fuentes de contaminación de aire, una caldera y vapores tóxicos que podrían ser generados en el proceso. Entre éstos se encuentra el ácido nítrico (HNO_3) que es un poderoso agente oxidante y que al ser usado sobre el cobre, genera vapores de óxidos nitrosos y nítricos que son muy tóxicos.

Otro de los ácidos a utilizarse, el clorídrico (HCL), tiene una presión de vapor alta lo que hace que se liberen cantidades considerables de ácido a la atmósfera. Durante las operaciones electrolíticas, generalmente se forma gas hidrógeno en el cátodo y oxígeno en el ánodo con suficiente velocidad para desprenderse cierta cantidad de la solución electrolítica.

Otra posible fuente de contaminación sería las partículas provenientes del polvo generado por el proceso de "sandblasting".

Algunos de los límites permitidos para estas emisiones son:

ácido crónico	.1 mg/m^3
hydrazine	1 ppm
hidróxido de sodio	2 mg/m^3
ácido clorhídrico	5 ppm
ácido sulfúrico	1 mg/m^3
ácido nítrico	2 ppm

El informe no detalla como se controlarán estos y otros vapores y contaminantes en el proceso. Información al respecto deberá ser incluida en la DIA final a someterse, así como también información sobre la altura de la chimenea a instalarse para disponer los gases de combustión de la caldera.

III. Desperdicios Sólidos

De ser posible el establecimiento de este proyecto industrial, es importante que el proponente tome en consideración las medidas a que hacemos mención.

Los desperdicios de construcción, los sólidos digeridos de la Planta de tratamiento de aguas usadas y residuos de la operación de empaque y cafetería deberán ser recogidos por el municipio o entidad privada debidamente certificada. Deberá notificarse oficialmente la entidad a ser responsable de esta operación finalmente.

Los recipientes utilizados para el almacenamiento deberán satisfacer, en número y capacidad, las necesidades que surjan de acuerdo al volumen de desperdicios que se generen en las distintas fases de este proyecto.

El Municipio de Aguadilla está operando un sistema de relleno sanitario. Este podrá ser utilizado para disponer los desperdicios de construcción, desperdicios de oficina, cafetería y empaque y los sólidos digeridos de la planta de tratamiento. Debe incluirse un documento de responsabilidad de parte de la persona encargada de recoger los cienos, debido a que una mala disposición de éstos podría traer como consecuencia la contaminación de algún cuerpo de agua superficial o subterráneo.

IV. Ruido

La DIA preliminar carece de información suficiente para llevar a cabo una evaluación completa sobre la contaminación por ruido. Para poder evaluar el impacto ambiental de este aspecto debemos recibir del proponente lo siguiente:

a. Información más específica sobre el tipo de maquinaria a usarse para evaluar el aumento de los decibeles.

b. Medidas para proteger a los obreros del incremento en ruido.

c. Información sobre el aumento del tráfico en el área para evaluar el incremento del ruido en la zona.

d. Más información sobre viviendas en el área.

e. Tiempo de exposición de los obreros a las máquinas como fuente contaminante de ruido.

V. Comentarios Misceláneos

En el proceso de galvanoplástia existe la posibilidad de riesgos de enfermedades ocupacionales debido a la presencia de emanaciones o vapores de compuestos inorgánicos y orgánicos. A tal efecto, el Departamento del Trabajo recomienda las siguientes medidas de control que deberán ser tomadas en consideración de llevarse a cabo el proyecto:

1. El uso de un sistema de ventilación por aspiración local para remover las emenaciones de las substancias contaminantes en cada uno de los tanques de electrodeposición de cromio.

2. Ventilación general suficiente en el área de trabajo.

3. Proveer equipo de protección personal: guantes, delantares, lavado de ojos, ducha de seguridad, viceras de cara o gafas de seguridad, zapatos o botas de goma.

4. Se deben realizar en forma periódica exámenes médicos apropiados a los riesgos potenciales que conllevan las operaciones.

5. En aquellas áreas de la fábrica donde se utilicen líquidos flamables deberán seguirse estrictamente las normas de seguridad establecidas.

Cordialmente,

Carlos Jiménez Barber
Director Ejecutivo

OP/ILC/rec

TRANSLATION OF LETTERS OF COMMENTS

Municipal Government
Aguadilla, Puerto Rico

Acknowledge is made of a copy of the EIS for the Digital Plant at Aguadilla and the invitation for us to comment or make recommendations on the report. We appreciate this opportunity.

We have evaluated the project as per our responsibility as City Mayor and as a citizen of Aguadilla, and I consider that the study made by Guzman and Associates is very logical and complete. The report clearly and profesionally indicates the advantages of the plant for being located at Bo. Montaña of Aguadilla, and the economical impact for the solution of chronic unemployment in this city.

We wish to express our appreciation to the P.R. Economic Development Administration, and our complete endorsement to this project, which will result in high benefits for the progress of Aguadilla.

Conchita Igartua de Suarez
City Mayor

DEPARTMENT OF NATURAL RESOURCES

After studying the EIS for the DEC plant at Aguadilla (Sol Num. 73-0 (8)-0267-773-044 ADM), this Department of Natural Resources wishes to make the following recommendations:

1. No waste of any type should be discharged into the Los Cedros Creek . This body of water has a very limited flow and its mouth is clogged most of the time. Should discharges are made, these will accumulate and will be detriment to the natural resources of the creek. Of the proposed alternatives for the disposal of the process wastes, the discharge to the regional sewerage system at Aguadilla seems the most acceptable. The use of the sink-hole for this purpose may alter the quality of the aquifer, as the trasmisibility at these areas is high.

2. No construction should be permitted at less than 5 meters from the creek. The distance should be measured from its sides.

3. The results of the dye tests should be include in the final EIS, to assure that the effluents will not affect the aquifer in the area, nor the ocean waters.

4. The proponents should apply for a permissions from this Department for digging of deep wells, in case that it is felt necessary to obtain water from this source. The application will be evaluated according to its merits.

We wish to indicate that land movement operations were already in progress when our technical staff visited this area.

Cruz A. Matos
Secretary

ENVIRONMENTAL QUALITY BOARD

The Environmental Quality Board (EQB) has revised the proposed EIS for the DEC project. We wish to indicate that according to P.L. No. 9 which establishes the public policy for environmental protection of the Commonwealth of Puerto Rico and the "Manual for the Preparation and Use of the EIS", all agencies which have submitted a preliminary EIS should wait until the comments and recommendations of the EQB, the general public and interested agencies are submitted before proceeding to start any construction on the land. In this specific case, aparently this was not done according to the law and the land movement operations were conducted. We follow with our comments.

We consider that the proposed action could significally affect the environment, and therefore a Final EIS must be submitted with the following information:

1. Water Quality

   A. Effluents

Additional information is regard to the proposed wastewater treatment plant must be submitted, including its efficiency, type, and cycle of operation.

On Pg 26, last paragraph, mention is made of a figure indicating the flow of the process wastes. This figure is not included in the draft EIS. The EIS should include the volume of the process waste, its origin and characteristics, and the concentrations of each constituents.

The proposal considers the possibility of discharging the process wastes, after treatment, to a natural sink-hole in land owned by the company, until the Aguadilla regional sewerage system is in operation.

The sink-hole is a deep cove of considerable dimensions. It is considered that before this cove is used for the proposed purposes, studies be made to determine the final movement of the wastes discharged.

It is our experience that the discharge of industrial effluents in sink-holes is not too safe. In this case it is not known for sure where the process wastes will go.

It is of utmost importance that dye tests be made to determine the circulation in the sink-hole.

The water level of the deep wells at Bejuco and Guerrero is 450 ft, and 225 ft at Montones. This level is close to sea level in these areas. However, no intrusion of salt water occurs, this being an indication that there is an aquifer in the area.

Based on this reasoning, the EQB do not agree on making the discharge of the process wastes to the proposed sink-holes until the dye tests are made and it is demostrated that the operation will cause no adverse effect to the environment.

A written compromise should be submitted indicating that DEC will connect to the regional sewerage system when this system is constructed.

B. Water Sources

The alternative selected as source of water for the project should be indicated. The section of the report dealing with this aspect is not too clear. Should the source of water is Acueductos, a written compromise should be included.

The immediate and future demand on water in regard to volume, uses, sources and disposal should be indicated in a more detailed form.

Should pre-treatment to all or part of the water to be used is contemplated, it should be indicated what kind of treatment will be provided, volume of water to be treated, and other pertinent details.

The posibility of re-cycling the water is mentioned. It should be indicated what portion of the water will be treated, and what treatment will be provided, giving additional details.

C. Security Measures

Information in this respect should include:

1. Procedures to be followed in case of spills of inorganic substances in the land owned by the plant.

2. Treatment to be provided to the waters which would flow on channels, should these are contaminated. Preventive measures should be indicated.

3. Treatment to be given to substances that may spill and will go to a tank to be constructed for this purpose.

4. Name of person responsible in case of spills, and the procedure to be followed in this case.

5. Measures to be taken to protect the sink-hole to prevent ~~the~~ that it could be partially clogged. This could change the natural drainage of the area.

D. Other

The report indicates that the use of ion exchangers is being considered. Should these is used, the process and purpose should be indicated.

The report indicates that a decantation panel will be used to separate the sludge containing metallic hydroxides. The panel has a filter membrane, and the supernatant liquid goes through this membrane.

The method of disposal for the supernatant is not indicated.

II. Air Quality

The project under consideration will have possible air pollution sources, as a boiler, and toxic vapors which might be generated during the process. Among these, nitric, acid, which is a powerfull oxidating agent. When combined with copper, it generates toxic vapors as nitric oxides, which are highly toxic.

Hydrochloric acid, which will also be used, has a high vapor pressure, and thus considerable amounts of acid will be released to the atmosphere. Hydrogen and oxygen will be formed during the electrolitic operations.

Another possible source of contamination is the dust particles released in the sandblasting process.

Some of the permissible limits for these emissions are:

Chromic acid	1 mg/m^3
Hydrazine	1 ppm
Sodium Hydroxide	2 mg/m^3
Hydrochlorid acid	5 ppm
Sulfuric Acid	1 mg/m^3
Nitric acid	2 ppm

The report does not provide information as to how these and other vapors will be controlled. This information should be included in the Final EIS, as well as the height of the stack to be installed for the discharge of the boiler gases.

III. Solid Wastes

Should the establishment of this industrial project is possible, it is important to mention that the proponent should take into consideration the measures which we indicate.

The solid wastes from the construction works, process waste operations, cafeteria and others should be collected by the Municipal Government or a private contractor which is dully certified. EQB should be notified of the agency or person to be responsible for this operations.

The solid wastes to be utilized for the storage of solid wastes should be decide according the the generation of solid wastes as to volume for each phase of the project. These should be adequate in size and capacity.

The Municipal Government of Aguadilla is operating a sanitary landfill. This could be utilized for the disposal of the solid wastes from the construction phase, office, cafeteria and packing wastes, as well as sludges from the process plan plant. The final report should include a document indicating the responsibility of the person to be in charge of collecting the sludges. Poor disposal of the sludge may contaminate any surface of deep source of water.

IV. Noise

The preliminary EIS needs additional information to make a complete evaluation on noise pollution. In order to evaluate the environmental impact in this respect, the following information should be submitted:

a. Additional information as to the type of machinery to be used in order to evaluate the decibels to be generated.

b. Protective measures to be taken to prevent increase in noise.

c. Information as to the increase in traffic in the area to evaluate the increase in noise.

d. Additional information as to houses in the area.

e. Exposure time of the workers to the machines, as source of noise pollution.

V. Miscellanous Comments

The process of electroplating involves the possibility of occupational health hazards because of the emissions of inorganic and organic vapors. Because of this reason, the Department of Health recomments the following security measures that should be taken into consideration should the project is implemented.

1. An adequate ventilating system to remove all the emissions of polluting substances in one of the electroplating tanks containing chromium.

2. Adequate general ventilation of the work area.

3. Provide safety equipment, as gloves, aprons, eye-wash, safety showers, safety glasses, rubber boots and safety shoes.

4. Periodic medical examinations should be done to the plant employees who are exposed to potential hazards.

5. Stric security measures should be taken at those areas where flamable liquids are used.

Carlos Jiménez Barber
Executive Director

Puerto Rico Aqueduct and Sewer Authority

Reference is made to your letter of July 19, 1973 in which you request our comments on the EIS for the Digital Equipment Corporation project at Aguadilla, Puerto Rico.

The final EIS should include a drawing indicating the area for the connection of the potable water line. It should also indicate the effect of this demand in the filtration plant capacity and source of raw water.

DEC proposes the discharge of the process wastes into a natural sink-hole after these have received treatment. This may cause contamination of the underground sources of water, even when we understand that this could be minimum because of its close location to the ocean.

On the other hand, Acueductos has projected a regional wastewater treatment plant for Aguadilla. DEC should coordinate with this Agency so that it can be integrated into the system once it is in operation.

Alvah R. Pierce
Director,
Planning Area

DEPARTMENT OF HEALTH

After a study made by our technical personnel, and from the point of view of environmental health, we have no objection to the proposed industrial project, should it is developed according to the EIS submitted to us.

However, we wish to make the following comments:

The EIS do not indicate the height of the stack to be installed for the combustion gases from the boiler. Consideration should be given to other industries to be established in the area in the future.

There is no indication of the waste disposal units to be used for storage of the solid wastes.

There is no indication as to where the final disposal of solid wastes will be done.

The discharge of inorganic wastes to a sink-hole, as proposed, should be considered and approved by the Environmental Quality Board.

Victor González, M.D.

ANSWER TO COMMENTS AND ADDITIONAL INFORMATION REQUESTED BY THE REGULATORY AGENCIES

DEPARTMENT OF NATURAL RESOURCES

1. It is not intended to discharge any domestic or industrial wastewaters to Quebrada Los Cerdos. The original study indicated that the flow of this creek is too small and its mouth is clogged most of the time. DEC is in agreement in respect to the comment that the connection to the Aguadilla regional wastewater system is the best solution to the problem. However, this is a long-term solution, as at this time the project is still in the design stage and has not been approved nor funded by the Commonwealth nor the Environmental Protection Agency.

2. It is not intended to have any construction at a close distance from the Los Cedros creek.

3. See EQB responses.

4. It is not expected to use depp well water in this area. Should at a later date it is determined that there is water in a nearby aquifer, a permit application will be filled and submitted to the Department of Natural Resources. As well, the analysis of the deep well water will be included, as required by the latest regulations of the Department of Natural Resources in relation to deep wells.

Aqueduct and Sewer Authority

No drawing of the proposed water supply system as requested by the Aqueduct and Sewer Authority is included, as this is being prepared at this time by the Authority's Design Division. DEC will supply the drawing once it is prepared.

Included is a letter from Mr. Pedro Hernandez Vega, Authority's Executive Director in regard to the water sypply project and the answer by Mr. José A. Nuñez, Development Vice-President of Fomento.

ENVIRONMENTAL QUALITY BOARD

I. Water Quality

A. Effluents

The proposed sanitary treatment plant is of the extended aeration activated sludge type. It is a Smith & Loveless Model V with an aeration tank capacity of 45,000 gallons and a clarifer with a surface area of approximately 230 square feet. In addition, treatment is preceded by a comminutor and followed by chlorination. The actual flow is expected to be approximately 25,000 gallons per day based on 900 employees first shift and 300 amployees second shift along with a cafeteria. Complete drawings and specifications are available from the office of Victor M. Garcia Associates.

The proposed industrial wastewaters treatment systems include integrated treatment; batch treatment; electrolytic recovery with independent electrolytic cells for the recovery of copper, tin, lead and gold; and conventional chemical precipitation and clarification. In addition, there will be deionized water rinses to reduce the volume of discharge from this facility. This treatment system comprises many of the most modern waste treatment techniques, is highly efficient, significantly reduces the volume of water normally expected in an electroplating facility of this size and results in an effluent satisfying not only the proposed 1977 EPA Standards, but the 1983 Standards as well. Attached are some exerpts from the Environmental Protection Agency which further describe the proposed waste treatment systems.[1]

It was Digital's intent to perform dye tests to absolutely determine

1 Environmental Protection Agency. "Upgrading Metal-Finishing Facilities to Reduce Pollution". July 1973.

the ultimate discharge of the sink-hole, however, sufficient water is not or was not available at the site to perform these tests. It should be considered that studies made by the U.S. Geological Survey indicate little chance of an aquifer in the area and that there are good technical reasons to believed that the sinkhole discharges to the ocean some 1.5 miles away.

Digital proposes to conduct the above mentioned tests at a later date when water is available at the site.

Digital will provide its own modern, high quality secondary treatment plant at this time, since a regional treatment system does not exist.

B. Water Sources

The source of water for this project is Acueductos. When the EIS was being prepared, consideration was given to several alternatives to obtain water. Digital, Fomento and Acueductos worked together and determined the best solution was to extend the Aguadilla pipeline system to the Industrial Park Site. An agreement has been made (copy attached) whereas Acueductos will install a pipeline comprising 16 inch and 8 inch diameter pipes to the Industrial Park Site. Other future industrial plants to be constructed near this site will also be able to use this water pipeline. Of the total cost of $205,000 for this pipeline project, Digital has contributed $103,000.

At the time the Draft EIS was written, it appeared that the short term water demands were 200,000 gallons per day and the long term demand might be 500,000 gpd. These water volumes are in line with what normally would be expected from an electroplating facility of this size. Due to the rapidly changing state-of-the-art of metal finishing waste treatment, new Federal effluent guidelines, and as a result of pilot plant experiments in Maynard, it now appears that water for industrial uses will be less than 50,000 gpd. This reduction is due to the integrated treatment systems, De-Ionized water

rinses, and other water re-use systems now contemplated for the project. This is equivalent to 90% recycling.

With the exception of an automatic backwash strainer and a sand gravel filter, no pre-treatment of the Acueductos water supply is being considered.

C. Security Measures

The plating areas are enclosed by six inch tall concrete curbs to contain accidental leaks and spills. There will also be trenches, sumps, pumps and a holding tank as part of a floor spill collection and treatment system. The chemical storage rooms will have a similar arrangement.

The chemical process engineer and the waste treatment chemical technician will be in charge of the preventive and corrective measures in case of accidental spillages.

It is doubtful that a sinkhole whose diameter is approximately 10 feet would get clogged or plugged with debris. In any event, a four foot high chain link fence will be installed around the sinkhole to prevent solid material and debris from going into the sinkhole. There are no colloidal or gelantinous matter contained in the effluent that could clog the sinkhole.

D. Other

Deionized water will be used for critical final rinsing treatments to minimize the presence of conductive salts in the evaporated rinse water films remaining on the printed circuit boards. The slightly contaminated DI rinse water will be collected from the various locations in the plant and be recycled through the deionizer for purification and re-use as high-quality water for various rinsing operations. A two-bed anion-cation type of ion exchanger will be used for purification of the contaminated DI water. In order

to supply the desired 25 gpm flow of DI water for production usage, A dual anion-cation exchanger system will be used. In this way one de-ionizer will deliver the full flow, while the second unit is being regenerated. Backwash from the carbon filters and de-ionizers will be sent to the treatment area for neutralization and precipitation.

The relatively clear supernatant liquid from the decant panel goes to a pH adjustment tank and eventually to the tube clarifier.

II. Air Quality

The boilers used to provide process steam are of a very small size and result in a minor emission. Two boilers, each 95 horsepower, are now expected for this process and one is a spare. A boiler operating under load will consume less than 30 gallons per hour of light oil. Burning 0.5 percent sulfur kerosene, this must be considered a "minor source".

With regard to toxic vapors associated with the plating process, the recommendations of the Occupational Safety & Health Act and the American Conference of Governmental Industrial Hygienists will be strictly adhered to. All tanks requiring exhaust ventilation will have slot type exhaust hoods as well as a push air system. Exhaust volumes will be based on the Threshold Limit Values, temperature and rate of gassing or misting of the chemicals involved. The approximate volume to be exhausted is 100,000 cubic feet per minute. Make-up air systems will provide fresh air to replace the volume being exhausted. Wet scrubbers will be used to remove pollutants from the exhaust. Condensate drains and drainline connections from the scrubbers will be directed to the waste treatment system. In the plating areas, approximately 40 air changes per hour or 1 1/2 air changes per minute will take place.

There are no dust particles released in the board sanding operation. This operation is wet sanding followed by water blasting in an enclosed machine. The effluent from this operation will go to a settling compartment where the sand and pumice is collected before discharge.

The stacks from the small boilers are only 12 inches in diameter. It is proposed to discharge the flue gases at a height above the roof line. Stack height is 20 ft.

III. Solid Wastes

Solid wastes from the construction operations will be disposed of at the Aguadilla sanitary landfill.

Once the plant is operational, solid wastes from the offices, cafeteria and packing wastes will be processed through stationary compaction equipment before ultimate disposal at the Aguadilla landfill. This equipment will include a shredder, a compactor, and a closed 30 yard container.

The thickened and dewatered sludge will be pumped to drums or to a tank truck for haul-away and disposal as sanitary landfill. Previous experience has indicated that this sludge, which is primarily oxides of copper, lead, tin and nickel, is very insoluble, and has not contaminated water sources. In addition, Digital is discussing with some scavengers and refiners in Puerto Rico, the possibility of recycling or reclaiming this waste.

IV. Noise

It is Digital policy to comply with the industrial noise standards of the Walsh-Healy Act and OSHA. In fact, Digital will not purchase manufacturing equipment whose sound level exceeds 85 DbA for a duration of eight hours per day.

The generation of noise in a plant of this type is minimal. Digital's plant in San Germán which has similar operations, is located across the street from a middle class residential neighborhood and no complaints of noise have ever been received.

There will be an increase in traffic on the roads leading to the plant in Aguadilla. This increase in traffic, about 300 cars per day, will result in additional noise and additional automobile emissions. This will be limited primarily to the "rush" hour before and after work and is unavoidable.

There are few houses in the area at the present time. It is expected that due to Digital and the future Fomento Industrial Park, additional houses will be built in the area. At this time it is not possible to estimate the number or location of these future homes.

Noise levels will be below the noise-exposure limits requiring operator protection or limited exposure times for the workers.

V. Miscellaneous Comments

An adequate ventilating system will be provided for the electroplating area complete with exhaust hoods, push air and scrubbers. The non-electroplating part of the plant shall be air conditioned.

Rubber gloves, aprons, boots and other safety equipment will be provided to employees in this area. Digital has an active safety and loss prevention department which makes certain that all environmental health and safety rules are being carried out.

It is Digital policy to have an Industrial Nurse on the premises and a doctor on call. This is presently the case in San Germán.

It is also the practice of Digital at all its plants around the world to provide the best possible protection for their employees. All safety measures are taken into consideration and a safety officer is appointed at each plant.

ADDITIONAL DATA AND INFORMATION AS RESPONSES TO EQB COMMENTS

Process Wastes

The volume of the process wastes is estimated as 150,000 gpd, although the recycling proposed may reduce this load by at least 50%.

The mineral constituent of the water are as indicated in the analysis of the Aguadilla water filtration plant. This water will be the source water for the Digital operations to be conducted. The process will add not more than 1.0 mg/1 copper, 0.1 mg/1 hexavalent chromium. There is no source of phenols, nickel, iron, cyanides, nor oil and greases.

This is in accordance with the proposed rules for effluent limitation guidelines and standards of performance and pretreatment standards for electroplating point source category, as published in the Federal Register, Vol 38 No. 193 of Friday, October 5, 1973. The proposed regulations are hereby included.

It is understood that the date of February 15, 1973 has been set by the EPA as its schedule for the promulgation of standards for this industry.

Digital is considering at this time to conduct only the "dry" operations at the Aguadilla plant, and hereby proposes not to discharge any process wastewaters into the sink-hole until one year after the plant is in operation. This will permit to perform at a later date the dye, salt or radioactive tests to the satisfaction of Digital, EQB and all concerned Government agencies, to insure that the wastewaters discharged in any way would affect the ground water resources or aquifer that might exist.

It is hereby proposed that the discharges to the sink-hole be limited only to the effluent from the package activated sludge plant, with a reduction of 90-95% B.O.D., and to the storm waters. It should be realized that the only practical way to discharge the wastewater effluents at this time at that area is the sink-hole.

Digital will consider on due time to join the Aguadilla regional wastewater treatment system. It is believed that at this point in time there is not a definite schedule for the construction of these facilities nor an estimate of the cost to join the system can be given by the Aqueduct and Sewer Authority. It is a well known fact that those treatment facilities, even in the construction stage, are behind the completion date.

Considerations were also given to the possibility of formation of metallic hydroxide with the minerals composing the sink-hole. It is theorized that the metallic oxides that could clog the sink-hole will not be formed, as most of the metals will be removed at the process plant, thereby going traces of the metals into the effluent.

The stoichiomethic point of chemical reaction will not be reached because of the minute concentration of metals in the effluent.

Security

The only inorganic substance of conern is acids. There is no bulk storage of acids. The amount of acids is small. For example, there will be only 5 drums of sulfuric acid in storage (refer to Table I Draft EIS).

There is little possibility of spills. If acids are spilled, these will be neutralized or diverted to the process waste plant. This is explained on Pg 25 of the Draft EIS.

All raw materials are kept in small containers in a warehouse. All materials are kept indoors.

Air Emissions

The amount of emissions from acids will be less than 0.05 mg/m^3 for all acids involved. It should be realized that the sophisticated and expensive equipment to be used by Digital for the PHT operations require extreme care and thus the control of acid emissions is of utmost importance, not only for the protection of the personnel working at the plant, but as well to

protect the equipment to be installed. Similar operations have been conducted at the San Germán plant with no apparent detrimental effects on the health of employees or corrosion of the equipment. Both the Department of Health and OSHA have surveyed the San Germán plant.

EXPLANATION OF INTEGRATED WASTE TREATMENT

This system was devised primarily to meet the need of the plating industry for improved rinsing, and to create savings to offset the costs of waste treatment. The basic concept of the intregated system is the segregation and treatment of the waste at the source. To accomplish this, the liquid film of plating solution which adheres to the part as it is removed from the bath is simultaneously treated and removed from the plated or processed part. The waste treatment is integrated into the processing sequence and no separate treatment plant is required. The system can be employed following any processing step which would result in toxic waste carryover, regardless of its position in the processing line. Its simplicity and reduced space requirements make it easily adaptable to existing processing lines.

In operation, a treatment wash tank is substituted for the first rinse tank following the plating operation. A treatment wash solution is continuously recirculated through this tank and physically removes the dragout, at the same time reacting chemically with it. The part is then rinsed with fresh water in the subsequent rinse tank. The effluent from this rinse tank is now uncontaminated with toxic dragout or precipitated metal hydroxides and requires no additional treatment.

The treatment solution is continuously recirculated between the treatment wash tank and a larger reservoir. The reservoir tank serves three major functions:

1. It is the all-important buffering component in the system which neutralizes the shock load caused by sudden and irregular changes in the quantity of plating or processing solution dragout treated.

2. It serves as a clarifier, settling out the insoluble metal oxides and hydroxides formed in the first stage of the reaction.

3. It serves as a retention tank, providing adequate time for the desired chemical reaction, such as oxidation of cyanates to carbon dioxide and nitrogen, treatment of nickel cyanide, silver cyanide complexes, etc., which take hours for completion.

Only one reservoir tank is required and several treatment wash tanks can be served by a common reservoir tank. Various metal wastes should not be mixed if metal recovery from the sludges is the aim.

The integrated system can be completely automated, but in smaller plants operates without the need for close control since high excesses of treatment chemicals are used in the closed loop. Relatively simple paper and spot tests are sufficient for control of the treatment process. Treatment chemicals are added either continuously or batch-wise as they are consumed by the toxic materials. A typical integrated system is shown in Figure 3.

The system has many advantages, such as :

a. Equipment costs are low, the equipment is integrated into the finishing line, occuping a minimum of floor space, and requiring no separate waste treatment plant.

b. Ease of supervision and control, because control is restricted to simple checks to ascertain the availability of excess treatment chemical in the system.

c. Better rinsing, elimination of staining, and reduction in rinsing rejects. Reduced quantities of water are used in view of the pre-rinse with chemicals, allowing 80-90% reuse of the waste waters, since the contaminating chemicals are added to increase the salt content of the waste water.

d. Minimum waste treatment chemical cost, since one of the major chemical consumpiton factors,the addition of caustic or acid to bring the waste rinse water into the correct pH range for treatment, is eliminated.

e. Sludge handling is simplified. The chemical system is so formulated that the precipitates are densely settled. The metal sludges are segregated, allowing simple and economical recovery of the metal values.

f. The individual chemical rinse stations operated with high content of excess reacting chemicals provide a fast and more complete treatment. Only the dragout from the treatment rinse reaches the rinse water; therefore it is easier to meet effluent quality requirements.

REFERENCES:

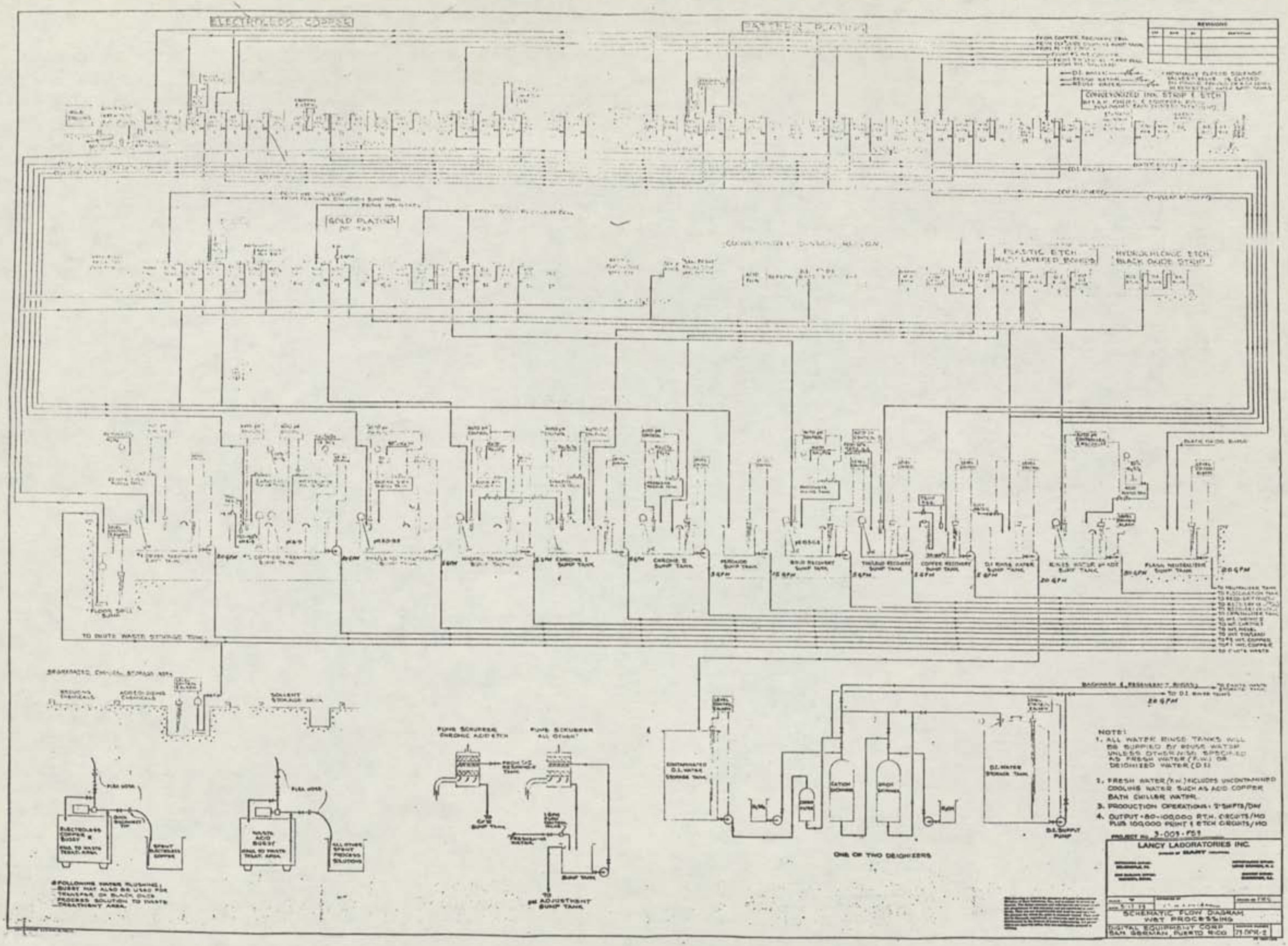
(1) Environmental Protection Agency
Technology Transfer Program

Upgrading Metal Finishing Facilities
to Reduce Pollution

Metal Finishing Waste Treatment

(2) L.E. Lancy, U. S. Pat. #2,725,314

(3) L.E. Lancy - Sewage & Indust. Wastes 26, 1117 (1954)


ELECTROLESS COPPER
PATTERN PLATING
CONVEYORIZED INK STRIP & ETCH
GOLD PLATING
PLASTIC ETCH MULTI LAYERED BOARDS
HYDROCHLORIC ETCH BLACK OXIDE STRIP
TO DILUTE WASTE STORAGE TANK
SEGREGATED CHEMICAL STORAGE AREA
SOLVENT STORAGE AREA
FUME SCRUBBER CHROMIC ACID ETCH
FUME SCRUBBER ALL OTHER
TO pH ADJUSTMENT SUMP TANK
CONTAMINATED D.I. WATER STORAGE TANK
D.I. WATER STORAGE TANK
D.I. SUPPLY PUMP
ONE OF TWO DEIONIZERS
TO D.I. RINSE TANKS
20 GPM
NOTE:
1. ALL WATER RINSE TANKS WILL BE SUPPLIED BY HOUSE WATER UNLESS OTHERWISE SPECIFIED AS FRESH WATER (F.W.) OR DEIONIZED WATER (D.I.)
2. FRESH WATER (F.W.) INCLUDES UNCONTAMINATED COOLING WATER SUCH AS ACID COPPER BATH CHILLER WATER.
3. PRODUCTION OPERATIONS - 2 SHIFTS/DAY
4. OUTPUT - 80-100,000 P.T.H. CIRCUITS/MO PLUS 100,000 PRINT & ETCH CIRCUITS/MO
PROJECT No. 3-003-F51
LANCY LABORATORIES INC.
SCHEMATIC FLOW DIAGRAM
WET PROCESSING
DIGITAL EQUIPMENT CORP
SAN GERMAN, PUERTO RICO
71 DFW-2

COMMONWEALTH OF PUERTO RICO
PUERTO RICO INDUSTRIAL DEVELOPMENT COMPANY
G.P.O. BOX 2350 SAN JUAN, PUERTO RICO 00936

CABLE ADDRESS
"INDEVELCO"

August 15, 1973

Mr. Edward A. Schwartz
General Councel
Digital Equipment Corporation
146 Main Street
Maynard, Massachusetts 01754

Dear Mr. Schwartz:

I am pleased to enclose herewith a copy of a letter from the Puerto Rico Aqueduct and Sewer Authority dated July 19, 1973, and its English translation, by means of which remittance of the amount of $202,500 is requested for the construction of the first stage of the project to supply the initial water requirements for the proposed Digital project to be located in Aguadilla.

We hereby request from Digital Equipment Corporation the remittance to the Puerto Rico Industrial Development Company of the approximate amount of $103,500, which is the agreed proportional share of the total construction costs of the first phase as per Digital's letter dated June 5, 1973.

Cordially yours,

José A. Núñez
Development Vice President

Enclosure

#107672

LO LIBRE ASOCIADO DE PUERTO RICO
TORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS

- 47 -

RECIBIDO
AUG 2 1973
OFICINA DE PLANIFICACION

19 de julio de 1973

Ing. José A. Nuñez
Vicepresidente de Desarrollo
Compañía de Fomento Industrial
de Puerto Rico
Apartado G.P.O. 2350
San Juan, Puerto Rico 00936

Asunto: Suministro de Agua a la
Digital Equipment Corporation

División de Proyectos

Estimado Ingeniero Nuñez:

Me place referirme a sus cartas del 14 de junio y del 3 de julio relacionadas con el asunto arriba indicado.

Puedo informarle que ya la primera parte del proyecto, que comprende la instalación de 1,500 metros lineales de tubería de 8" y 2,600 metros lineales de 16", está en diseño. Esperamos que los planos estén terminados para mediados del mes de agosto. Dándole un mes adicional para las aprobaciones correspondientes, esperamos que la construcción pueda iniciarse a principios de octubre y terminarse para principios del mes de enero.

Con el propósito de ir realizando los trámites para la compra de la tubería, agradeceríamos que esa agencia nos transfiriera los $202,500, que es el costo estimado para la primera etapa, e informado en nuestra carta del 10 de abril de 1973.

Cordialmente,

PEDRO HERNANDEZ VEGA
Director Ejecutivo

RECIBIDO
JULIO 1973
DESARROLLO
VICEPRESIDENTE

RECIBIDO
JUL 23 1973
Oficina de Proyectos

FRIDAY, OCTOBER 5, 1973

WASHINGTON, D.C.

Volume 38 ■ Number 193

PART II

ENVIRONMENTAL PROTECTION AGENCY

■

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR ELECTROPLATING POINT SOURCE CATEGORY

Proposed Rules

federal register

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 413]

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR ELECTROPLATING POINT SOURCE CATEGORY

Notice of Proposed Rulemaking

Notice is hereby given that effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources set forth in tentative form below are proposed by the Environmental Protection Agency (EPA) for the electroplating of copper, nickel, chromium and zinc on ferrous, non ferrous and plastic materials subcategory of the electroplating category of point sources pursuant to sections 304(b), 306(b) and 307(c) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, 1314 and 1316, 1316(b) and 1317(c), 86 Stat. 816 et seq.) (the Act).

(a) Legal authority.

(1) Existing point sources.

Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b) to the Act. Section 304(b) of the Act requires the Administrator to publish, within one year of enactment of the Act, regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment, techniques, process and procedure innovations, operating methods and other alternatives.

(2) New sources

Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

Section 306(b)(1)(A) of the Act requires the Administrator to publish a list of categories of sources within 90 days after the date of enactment of the Act (October 18, 1972). Within one year after a category of sources is included on the list, the Administrator is required to propose regulations establishing Federal standards of performance for new sources within such category. The Administrator published in the FEDERAL REGISTER of January 16, 1973 (38 FR 1624) a list of 27 source categories. The electroplating source category was included on the list. The regulations proposed herein set forth the standards of performance applicable to new sources within the electroplating of copper, nickel, chromium and zinc on ferrous, nonferrous and plastic materials subcategory of the electroplating source category.

Section 307(c) of the Act requires the Administrator to promulgate pretreatment standards for new sources at the same time that standards of performance for new sources are promulgated pursuant to section 306. Section 413.15 proposed below provides pretreatment standards for new sources within the electroplating of copper, nickel, chromium and zinc on ferrous, nonferrous and plastic materials subcategory of the electroplating source category.

Section 304(c) of the Act requires the Administrator to issue to the States and appropriate water pollution control agencies information on the processes, procedures or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under section 306 of the Act. The report referred to below provides, pursuant to section 304(c) of the Act, preliminary information on such processes, procedures or operating methods.

(b) Summary and basis of proposed effluent limitations guidelines, standards of performance and pretreatment standards for new sources.

(1) General methodology.

The effluent limitations guidelines and standards of performance proposed herein were developed in the following manner. The point source category was first studied for the purpose of determining whether separate limitations and standards are appropriate for different segments within the category. This analysis included a determination of whether differences in raw material used, product produced, manufacturing process employed, age, size, waste water constituents and other factors require development of separate limitations and standards for different segments of the point source category. The raw waste characteristics for each such segment were then identified. This included an analysis of: (1) Source, flow and volume of water used in the process employed and the sources of waste and waste waters in the operation; and (2) the constituents (including thermal) of all waste water. The constituents of the waste waters which should be subject to effluent limitations and guidelines standards of performance were identified.

The full range of control and treatment technologies existing within each segment was identified. This included an identification of each distinct control technology, including both inplant and end-of-process technologies which are existent or capable of being designed for each segment. Also included was an identification, in terms of the amount of constituents (including thermal) and the chemical, physical, biological characteristics of pollutants, of the effluent level resulting from the application of each of the treatment and control technologies. The problems, limitations, and reliability of each treatment and control technology and the required implementation time was also identified. In addition, the nonwater quality environmental impact, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise and radiation were also identified. The energy requirements of each control and treatment technology identified as well as the cost of the application of such technologies were identified.

The information, as outlined above, was then evaluated in order to determine what levels of technology constitute the "best practicable control technology currently available," "best available technology economically achievable" and the "best available demonstrated control technology, processes, operating methods, or other alternatives." In identifying such technologies, various factors were considered. These included the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, nonwater quality environmental impact (including energy requirements) and other factors.

The data on which the above analysis was performed was derived from consultant reports, site inspections, published and unpublished technical literature, State pollution control agencies and industry submissions.

The pretreatment standards proposed herein are intended to be complementary to the pretreatment standards proposed for existing sources under Part 128 of 40 CFR. The basis for such standards is set forth in the FEDERAL REGISTER of July 19, 1973, 38 FR 19236. The provisions of Part 128 are equally applicable to sources which would constitute 'new sources," under section 306 if they were to discharge pollutants directly to navigable waters, except for section 128.133. That section provides a pretreatment standard for "incompatible pollutants" which requires the application of the "best practicable control technology currently available," subject to an adjustment for amounts of pollutants removed by the publicly owned treatment works. Since the pretreatment standards proposed herein apply to new sources, section 413.15 below amends section 128.133 to require application of the standard of performance for new sources rather than the "best practicable" standard applicable to existing sources under sections 301 and 304(b) of the Act.

(2) Summary of conclusions with respect to electroplating of copper, nickel, chromium and zinc on ferrous, nonferrous and plastic materials subcategory.

Electroplating is the electrodeposition of an adherent coating upon an electrode for the purpose of securing a surface with properties or dimensions different from those of the basis material. The primary reasons for applying the plated coatings are (i) to produce and retain a desired surface appearance, for example, color or luster; (ii) to protect the basis material against corrosion; (iii) to protect the basis material against some specific chemical reaction; (iv) to protect the basis material against wear caused by either abrasion or erosion; or (v) to increase the dimensions of the basis material.

An electroplating process consists of a series of operations which include (1) preparation for plating, (2) plating, and (3) postplating treatments. Preparation for plating normally consists of alkaline cleaning and acid dipping to remove dirt and scale prior to plating. Rinsing in a separate tank or tanks follows both alkaline cleaning and acid dipping. The plating step consists of one or more operations in which the workpiece is immersed in a solution, and acquires an electrodeposited coating of one or more metals. Rinsing follows each plating operation. Postplating treatments are common for zinc-plated steel and copper-plated products and consist primarily of bright dipping, chromate filming, and coloring. Rinsing also follows each postplating operation.

The electroplating of copper, nickel, chromium, and zinc on ferrous, nonferrous, and plastic materials is a single subcategory of the electroplating point source category for the purpose of establishing effluent limitations guidelines and standards of performance. The consideration of other factors such as the age and size of the facilities, processes employed, waste water constituents, and waste control technologies further substantiate that copper, nickel, chromium, and zinc electroplating should be considered one subcategory.

The known significant pollutants contained in the waste waters from this subcategory include copper, hexavalent chromium, total chromium, oxidizable cyanide, total cyanide, nickel, zinc, pH, and suspended solids. While other pollutants, such as iron, sometimes may be present in the waste waters from this subcategory, effluent limitations were not developed for these constituents because (i) they are discharged intermittently and in small quantities; (ii) they are effectively removed from the effluent by the application of waste water control and treatment technology required for the removal of waste water constituents which are subject to effluent limitations; and (iii) in almost all cases, there is insufficient data available upon which to base effluent limitations.

Because [illegible] water is required for effe[illegible] electroplated parts, [illegible] has traditionally used large amounts of water and generally has limited water use only to the extent required by the cost of the water utilized. Wastewater control techniques such as process modifications, material substitutions, water conservation, and good housekeeping techniques are available to reduce the quantities of pollutants ultimately discharged from electroplating facilities. Most of these control techniques have been effectively demonstrated and are considered normal practice in the industry.

Process modifications can reduce the quantity of pollutants in the waste waters from electroplating operations. These include (i) elimination of copper plating prior to nickel and chromium plating, especially for plating on steel; (ii) elimination of copper plating by increasing the thickness of nickel; (iii) substitution of a nickel strike for a copper strike and the replacement of the high-rate copper cyanide solution with a copper sulfate bath; and (iv) substitution of low-concentration electroplating solutions for high-concentration solutions.

Material substitutions can also reduce the quantities of pollutants discharged. Such substitutions include (i) replacement of cyanide-copper and cyanide-zinc plating solutions with low-cyanide or cyanide-free plating solutions, and (ii) use of trivalent chromium plating baths to eliminate the presence of hexavalent chromium. In addition to eliminating a potentially toxic pollutant, this material substitution could reduce waste treatment cost by eliminating the need for the reduction of hexavalent chromium.

Water conservation techniques reduce the amount of water used in electroplating processes and also can reduce the amount of pollutants in the effluent following chemical treatment. Some of these include methods to (i) improve racking procedures to facilitate drainage from workpiece surfaces over process tanks; (ii) increase drainage time over the process tanks; (iii) reduce the viscosity of the process solutions by dilution or heating; (iv) add wetting agents to the process solutions to reduce surface tension; (v) install fog nozzles above process tanks to return a portion of the solution remaining on the workpiece to the process solution; (vi) install reclaim tanks between process tanks and rinse tanks to collect dragout for return to the process solution; (vii) install counter flow rinsing tanks whereby the water in the last rinsing tank becomes feedwater for the preceding tank; and (viii) install air or ultrasonic agitation devices in the rinse tanks.

Good housekeeping techniques can reduce the amount of pollutants in the waste waters from electroplating facilities. These include techniques to (i) maintain racks and rack coatings to prevent the transfer of chemicals from one operation to another (loose rack coatings are noteworthy as an example of poor practice); (ii) avoid overcrowding parts on a rack, which inhibits drainage when parts are removed from a process solution; (iii) plug all floor exits to the sewer and contain spills in segregated curbed areas or trenches, which can be drained to direct the spills to rinse-water effluent with the same chemicals; (iv) wash all filters, pumps and other auxiliary equipment in curbed areas or trenches, which can be drained to direct the wash water to a compatible holding tank or rinse water stream; (v) install anti-syphon devices on all inlet water lines to process tanks; (vi) inspect and maintain heating and cooling coils to avoid leaks; and (vii) inspect and maintain all piping installed for waste water flow, including piping from fume scrubbers.

Conventional chemical treatment consisting basically of cyanide oxidation, hexavalent chromium reduction, and coprecipitation of heavy metals as hydroxides has been a standard end-of-process waste water treatment technique for the electroplating industry for twenty-five years. Most companies achieving good effluent quality practice some form of chemical treatment in combination with in-plant controls to minimize water use and optimize the precipitation process. Numerous plants employing techniques such as ion exchange, reverse osmosis, evaporative recovery, etc., were investigated but none achieved substantially better effluent quality than those employing good rinsing techniques, practicing good housekeeping, and utilizing well-controlled chemical treatment. The use of concentration techniques such as evaporative recovery was found to be effective in reducing water costs, recovering metal values, and effecting better precipitation. However, chemical treatment remains a requirement for most electroplating processes. The elimination of the discharge of process waste water pollutants can be accomplished by water recovery, by evaporation condensation, or by reverse osmosis in combination with chemical treatment and filtration for acid or alkali waste. Ion exchange is useful for waste water conservation, but is not practical for eliminating waste water constituents at the end of the process. The preferred mode of operation is to conserve all plating bath chemicals and return them to the plating bath, and concentrate all other chemicals (from preplate and postplate operations) for chemical treatment and environmentally acceptable disposal in a solid state. Where solids disposal is a problem, any of the other previously mentioned control techniques should be considered to minimize the production of sludge. Metals recovery is particularly important in this industry because of the relatively high value of the metals components of the sludge and the need to conserve such scarce natural resources. Electroplaters should be aware of their responsibility for proper handling of sludges containing heavy metals. Further technical evaluation is necessary in order to make technical judgments regarding specific practices, and to assess relative cost impacts of the several alternatives.

It is estimated that the total annual cost of chemical treatment would amount to approximately 15 percent of sales for medium to large facilities (24 square

meters plated per hour or more) and approximately 37 percent of sales for very small facilities (24 square meters plated per hour or less). These estimates represent maximum increases and assume that no controls are currently in place. The incremental cost to eliminate the discharge of pollutants by combining chemical treatment with other control and treatment technologies is estimated to be approximately 8 percent of sales for facilities plating more than 54 square meters per hour and from 6 percent to 15 percent for facilities plating less than 54 square meters per hour. The cost of lagooning or landfilling sludges after chemical or other treatment has not been considered in arriving at the above cost estimates. For ecological reasons, an alternative to landfilling should be sought, such as recovery of metal values. Firm data on the relative costs of landfilling or recovery of metals is not yet available. However, current expenditures by industrial waste generators for treatment and disposal of hazardous waste sludges are believed to be low relative to the cost required for adequate treatment and disposal. Small electroplating facilities may be able to offset economic disadvantages by combining wastes for treatment and disposal.

The electric power used for plating consumes about 0.06 percent of the nation's electrical energy (1.7×10^{12} kilowatt hours). The power required for chemical treatment is approximately 3.2 percent of the power needed for plating. Reverse osmosis will eliminate the discharge of pollutants (when combined with chemical treatment) using 27 percent of the power required for electroplating. The nonwater quality environmental impact of the chemical treatment of electroplating wastes consists of increased sludge production resulting from the removal of soluble metals from the waste waters as insoluble hydroxides and the proper disposal of these hydroxides. The nonwater quality environmental impact of achieving zero discharge of pollutants from the electroplating industry involves two principal considerations, energy requirements and sludge production and disposal. The application of waste water concentration techniques, such as evaporation, to recover process chemicals and reuse the condensate for rinsing requires energy for heat exchange and pumping. The solid wastes produced from such operations and from chemical treatment must be controlled to prevent their entry into navigable waters or into subsurface waters.

Solid constituents from the waste water should be disposed of in an acceptable landfill, which means a landfill at which complete long term protection is provided for the quality of surface and subsurface waters, from hazardous substances contained in electroplating wastes deposited therein, and against hazard to public health and the environment. Such sites should be located and engineered to avoid direct hydraulic continuity with surface and subsurface waters, and any leachate or subsurface flow into the disposal area should be contained within the site unless treatment is provided. Where appropriate, the location of the solid hazardous materials disposal site should be permanently recorded in the application office of legal jurisdiction.

The best practicable control technology currently available for this electroplating subcategory of point sources has been determined to be a well-designed and well-operated chemical treatment system to destroy cyanide, precipitate heavy metals, and separate solids from the waste stream prior to discharge. The best practicable control technology currently available includes those in-process controls which are considered normal practice in the industry. The in-process controls available to improve the quality of effluent from electroplating facilities, and which are considered normal practice in the industry, include, but are not limited to, (i) process modifications which include the elimination of a plating operation or substitution of one plating operation for another; (ii) water conservation techniques which include the modification of the number and type of rinsing stations used, e.g. installation of countercurrent rinses and reclaim tanks; (iii) material substitutions to eliminate pollutants from the plating bath and, ultimately, from the effluent, e.g. cyanide free plating baths; and (iv) good housekeeping techniques to contain spills and leaks from plating solutions, to detect pollutants in cooling water streams, and to hold concentrated solutions prior to treatment.

Numerous alternatives are available to the electroplater in addition to those outlined under the four general categories of in-process controls described above. The choice of a particular in-process control strategy depends upon the nature of the specific electroplating facility. Any one or combination of in-process controls in addition to chemical treatment may be required to meet the effluent limitations based upon the best practicable control technology currently available.

The best available technology economically achievable for this subcategory of the electroplating point source category has been determined to be a combination of in-process and end-of-process control and treatment to achieve no discharge of process waste water pollutants. By the use of in-process controls to reduce the volume of waste water, it becomes economical to use end-of-process treatment designed to recover water and reuse the water within the plant, thus avoiding any discharge of effluent to navigable waters. Solid constituents in the waste water are disposed of in an acceptable landfill. One such type of treatment system that has been designed and is currently in operation supplements conventional chemical treatment with the use of reverse osmosis to recover water from the treated waste stream. Additional water is recovered for reuse by evaporation of the concentrated waste stream from the reverse osmosis unit.

New source performance standards to be achieved by new sources within the category are based on the application of the best available demonstrated control technology. The best available demonstrated control technology has been determined to be the extensive use of in-plant controls and process modifications to minimize water use in combination with a well-designed and well-operated chemical treatment system to minimize the discharge of pollutants. The best available demonstrated control technology implies a minimum of double countercurrent rinsing after each process plating tank and on the acid/alkali stream to allow the plater maximum flexibility to incorporate additional treatment and control techniques as they become technically feasible and economically attractive. Such techniques have been demonstrated to various degrees and include ion-exchange, reverse osmosis, evaporative recovery and others. Furthermore, the best available demonstrated control technology includes waste stream segregation, where necessary, to achieve effluent limitations and facilitate the use of advanced treatment techniques as they become available. Each of the control and treatment alternatives discussed previously are applicable to new sources in the electroplating category. The options open to new sources to achieve no discharge of process waste water pollutants are more numerous and varied than those for existing sources because of their flexibility in engineering design.

Some of the pollution control and treatment techniques available for use by new sources include (i) countercurrent rinse tanks to minimize water flow at all rinse stations; (ii) processes eliminating the use of some chemicals requiring treatment, e.g., cyanide; (iii) waste water concentration techniques such as ion-exchange, reverse osmosis, evaporative recovery, etc., at appropriate locations both in-process or end-of-pipe; (iv) complete segregation of waste water streams to optimize chemical treatment efficiency; and (v) specialization in processes which minimize the production of pollutants or which produce pollutants amenable to control and treatment.

As an adjunct to the technical analysis, an economic impact analysis was conducted. This analysis concluded that the proposed guidelines for 1977, 1983 and for new sources are not expected to have any significant effect on the production capacity or future growth of the electroplating industry. It is likely, however, that significant prices increases will result as the cost of the guidelines are passed on to customers. These increases are projected to be a maximum of 15 percent for 1977 with additional increase of about 8 percent for 1983. In addition, due to disproportionate cost increases resulting from 1977 guidelines, a number of low volume job shops may be forced to close. This would be the case especially for an estimated maximum of 380 very small facilities, plating less than 24 square meters per hour. These shops

would represent approximately 760 employees and about 1.7 percent of total capacity for the job shop sector. The projected price increases and the potential closures among small job shops are not expected to have any balance of trade effects.

A draft report entitled "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the COPPER, NICKEL, CHROMIUM and ZINC Segment of the Electroplating Point Source Category" further describes the analysis undertaken in support of the regulations being proposed herein and is available for inspection in the EPA Information Center, Room 227, West Tower, Waterside Mall, Washington, D.C., at all EPA regional offices, and at State water pollution control offices. A supplementary analysis prepared for EPA of the possible economic effects of the proposed regulations is also available for inspection at these locations. Copies of both of these documents are being sent to persons or institutions affected by the proposed regulations, or who have placed themselves on a mailing list for this purpose (see EPA's Advance Notice of Public Review Procedures, 38 FR 21202, August 6, 1973). An additional limited number of copies of both reports are available. Persons wishing to obtain a copy may write the EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Philip B. Wisman.

(c) Summary of public participation. Prior to this publication, the agencies and groups listed below were consulted and given an opportunity to participate in the development of the effluent limitations guidelines and standards of performance for the electroplating of copper, nickel, chromium and zinc on ferrous, nonferrous and plastic materials subcategory. The following are the principal agencies and groups consulted: Effluent Standards and Water Quality Information Advisory Committee (established under section 515 of the Act), all State and U.S. Territory Pollution Control Agencies, New England Interstate Water Pollution Control Commission, Ohio River Valley Sanitation Commission, Delaware River Basin Commission, The American Society of Mechanical Engineers, The American Society of Civil Engineers, Hudson River Sloop Restoration, Inc., The Conservation Foundation, Environmental Defense Fund, Inc., Natural Resources Defense Council, Water Pollution Control Federation, National Wildlife Federation, Department of the Interior, Department of Commerce, Water Resources Council, Department of Defense, Atomic Energy Commission, Department of Housing and Urban Development, Department of the Treasury, National Association of Metal Finishers, Metal Finishers Suppliers Association, and the American Electroplaters Society.

The primary issue raised during the development of effluent limitations guidelines and standards of performance concerned the impact of the effluent limitations on the small electroplating job shop. The electroplating industry expressed concern about several aspects of the effluent limitations and the implicit control and treatment technology. The principal issues raised were:

(1) The extent to which the costs of the application of technology to meet effluent limitations had been considered;

(2) The extent to which the technology required to attain the effluent limitations had been demonstrated;

(3) The extent to which the technology might not be employable because of space limitations in the facility; and

(4) The extent to which process variations such as barrel plating and rack plating of complex shapes had been considered.

During the development of effluent limitations guidelines and standards of performance for the electroplating category of sources, the costs of the application of control and treatment technologies to achieve the effluent limitations have been carefully considered. Nevertheless, some electroplaters may experience financial difficulty in attaining effluent limitations based on the best practicable control technology currently available because of individual peculiarities such as size, geographical location or age of the facility. Where these peculiarities become critical, the choices for the plater may become relocation, judicious space utilization, cooperative waste treatment, or specialization. However, the guidelines were developed to allow the maximum flexibility to meet the effluent limitations with a combination in-plant controls and end-of-pipe treatment. Thus the impact on the small job shop should be minimized.

The best practicable control technology currently available for this subcategory of sources was determined to be chemical treatment with such in-plant controls as are necessary to minimize water use. Conventional chemical treatment to destroy cyanide, precipitate heavy metals, and separate solids from the liquid waste stream has been practiced by the industry for many years. The effectiveness of such systems has been adequately demonstrated in industrial electroplating facilities of all sizes and configurations. The major variations of chemical treatment (batch, continuous, and integrated) provide technical and economic flexibility to the plater to fit individual needs. To meet the effluent limitations based on the application of the best practicable control technology currently available, many platers will be required to reduce significantly their present water usage in addition to employing chemical treatment. Numerous adequately demonstrated, inexpensive techniques are available to do so. These in-plant controls (water conservation techniques) range from improved racking procedures to installation of additional countercurrent rinse tanks. Additional details of the in-plant controls normally practiced by this industry appear in the development document referenced in this section.

The installation of any equipment to reduce water pollution or to increase plating capacity requires space. Some platers may have little or no space for the installation of chemical treatment tanks, rinse tanks, or plating tanks. Nevertheless, these platers have several options available to them to reduce the discharge of pollutants without using additional floorspace. Some examples of these include: (1) reduction of dragout by improving process controls such as bath temperature and composition, positioning of work pieces on racks, etc., (2) installation of dole valves, fog rinses, etc., or (3) conversion of existing series rinse tanks to countercurrent. Once water usage is minimized by in-process controls, any of several additional waste water treatment alternatives requiring minimum space may become attractive. Batch or integrated chemical treatment may be feasible with the reduced flow. Tanks of a moderate size may be feasible to hold wastes for periodic removal by a scavenger service or other responsible waste treatment and disposal contractor. As the volume of waste water to be treated is reduced, the option to treat at another location may become attractive. The combined treatment of wastes from several electroplating facilities in the same geographical area all with space limitations may become practical. The use of space above and below existing process lines is common practice in engineering laboratories and the chemicals industries. While it is not possible to offer solutions to every plater's space problems, the number of possible solutions is larger than normally assumed.

The choice of rack or barrel methods for plating is based on the size and quantity of the parts to be processed per unit of time. Neither of these conditions imposes a significant technical change in the operations for electroplating. The selection is always based on economic considerations because hand racking of small parts is usually more costly than dumping them in a barrel for processing in bulk. Technically, any plating operation can be done either by rack or by barrel operations. Sometimes plating bath compositions will be modified by altering the concentration of solution constituents. However, the same types of salts, acids, and additives will be used. Thus, the impact on waste characteristics is not changed. The volume of waste water (dragout) is frequently greater in barrel plating operations but the final effluent quality is not a function of influent concentration. Techniques are available to reduce the rinse water volumes in barrel plating to the levels of rack plating. If the shape of the parts being plated requires the use of in-process controls such as countercurrent rinsing, evaporation, or other advanced recovery systems for achieving reduced water use to counteract the effect of unusually high dragout, any supplemental cost should be reflected in the cost of the plated product. Any such incremental increase in the cost of plating will direct attention to the design of parts that drain more easily to reduce dragout. Techniques are available to reduce the rinse water volumes from the plating of complex shapes to the levels of simple, well-drained shapes.

Several comments were received concerning the production basis of the guidelines. The most appropriate production unit in some industries is either the weight of product produced or the quantity of raw materials used. Neither of these bases is appropriate for the electroplating industry. The weight of products bears no relation to the raw waste produced inasmuch as electroplating is a surface process which is not influenced by the volume or density of the products or the thickness of metal plated. The amount of raw materials used is not an accurate indicator of the waste produced. The consideration of many factors led to the conclusion that the unit of production most appropriate for the electroplating industry is plated area. Although the total surface area withdrawn from a plating solution is the principal factor influencing the dragout of constituents from the plating solution and, ultimately, the amount of pollutants in the waste water, the total surface area is rarely known and may be impractical to measure in the typical electroplating shop. Therefore the plated area, which either is known or is calculable, is the logical alternative unit of production. Alternative units of production based on amperes and water used were developed and correlated with plated area and total surface area during the development of effluent limitations; however, area plated provided the best basis for establishing effluent limitations. The electroplating industry is invited to submit comments on the proposed production basis of the guidelines, and to suggest alternative units of production. The supporting rationale for such suggestions should be included with the comments.

The economic impact studies show a more severe economic impact on very small shops than the rest of the industry on the basis of very limited information. Interested persons are invited to submit comments on any aspect of the proposed guidelines, particularly as they affect the small plater whether he discharges into surface waters or a municipal treatment system. Information on alternative treatment technologies to meet the guidelines and the associated costs are specifically requested. The number, size, and locations of plants affected by the guidelines has been estimated by EPA. Any external estimates by industry are invited. On the basis of the information available, EPA will consider segmentation on the basis of size in the final regulation.

Interested persons may participate in this rulemaking by submitting written comments in triplicate to the EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460. Attention: Mr. Philip B. Wisman. Comments on all aspects of the proposed regulations are solicited. In the event comments are in the nature of criticisms as to the adequacy of data which is available, or which may be relied upon by the Agency, comments should identify and, if possible, provide any additional data which may be available and should indicate why such data is essential to the development of the regulations. In the event comments address the approach taken by the agency in establishing an effluent limitation guideline or standard of performance, EPA solicits suggestions as to what alternative approach should be taken and why and how this alternative better satisfies the detailed requirements of sections 301, 304(b), 306 and 307 of the Act.

A copy of all public comments will be available for inspection and copying at the EPA Information Center, Room 227, West Tower, Waterside Mall, 401 M Street SW., Washington, D.C. A copy of preliminary draft contractor reports, the Development Document and economic study referred to above and certain supplementary materials supporting the study of the industry concerned will also be maintained at this location for public review and copying. The EPA information regulation, 40 CFR Part 2, provides that a reasonable fee may be charged for copying.

All comments received by November 1, 1973 will be considered. Steps previously taken by the Environmental Protection Agency to facilitate public response within this time period are outlined in the advance notice concerning public review procedures published on August 6, 1973 (38 FR 21202).

Dated October 1, 1973.

RUSSELL E. TRAIN,
Administrator.

PART 413—EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE ELECTROPLATING CATEGORY

Subpart A—Electroplating of Copper, Nickel, Chromium and Zinc on Ferrous, Nonferrous and Plastic Materials Subcategory

Sec.

Subpart A—Electroplating of Copper, Nickel, Chromium and Zinc on Ferrous, Nonferrous and Plastic Materials Subcategory.

§ 413.10 Applicability; description of electroplating of copper, nickel, chromium and zinc on ferrous, nonferrous and plastic materials subcategory

The provisions of this subpart are applicable to discharges resulting from the process in which a ferrous, nonferrous, or plastic base material is electroplated with copper, nickel, chromium, zinc, or any combination thereof.

§ 413.11 Special definitions.

For the purposes of this Subpart A:

(a) The term "process waste water" shall mean any water which comes into contact with any ferrous, nonferrous, or plastic basis material undergoing a copper, nickel, chromium, or zinc electroplating process, and shall include, but not be limited to, waste water from preplating, rinsing, and postplating, operations.

(b) The term "process waste water pollutants" shall mean pollutants contained in process waste waters.

(c) For the purposes of this subpart, the following abbreviations shall have the following meaning: (1) mg shall mean milligram(s); (2) sq m shall mean square meters of surface plated with copper, nickel, chromium, or zinc; (3) lb shall mean pound(s); (4) sq ft shall mean square feet of surface plated with copper, nickel, chromium, or zinc; (5) Cu shall mean total copper; (6) Ni shall mean total nickel;; (7) Cr^{6+} shall mean hexavalent chromium; (8) CrT shall mean total chromium (9) CN shall mean cyanide, total or oxidizable as noted; (10) SS shall mean suspended solids; and (11) pH shall mean the negative logarithm of the hydrogen ion concentration.

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

(a) The following table sets forth the effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available by a point source subject to the provisions of this subpart:

TABLE I.—EFFLUENT LIMITATIONS BASED ON BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE

Effluent characteristic	Effluent limitation	
	Maximum for any one day	
	mg./sq. m.	lb./10^6 sq. ft.
Copper (Cu)	80	16.4
Nickel (Ni)	80	16.4
Chromium, hexavalent (Cr^{+6})	8	1.6
Chromium, total (CrT)	80	16.4
Zinc, (Zn)	80	16.4
Cyanide, oxidizable (CN)	8	1.6
Cyanide, total (CN)	80	16.4
Suspended solids (SS)	2,400	491
pH	Within the range of 6.0 to 9.5	

Effluent characteristic	Effluent limitation	
	Maximum average of daily values for any period of 30 consecutive days	
	mg./sq. m.	lb./10^6 sq. ft.
Copper (Cu)	40	8.2
Nickel (Ni)	40	8.2
Chromium, hexavalent (Cr^{+6})	4	0.8
Chromium, total (CrT)	40	8.2
Zinc, (Zn)	40	8.2
Cyanide, oxidizable (CN)	4	0.8
Cyanide, total (CN)	40	8.2
Suspended solids (SS)	1,200	246
pH	Within the range of 6.0 to 9.5	

§ 413.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

(a) The effluent limitation representing the degree of effluent reduction attainable by the application of the best available technology economically achievable is no discharge of process waste water pollutants.

(b) Application of the factors listed in Section 304(b) may require variation from the effluent limitation set forth in this Section for any point source subject to such effluent limitation with a production less than 120 sq m per hour. If variation is determined to be necessary for any such source, such source shall be subject to effluent limitations no less stringent than those required by the standards of performance for new sources set forth in § 413.14.

§ 413.14 Standards of performance for new sources.

(a) The following table sets forth standards of performance representing the degree of effluent reduction attainable by the application of the best available demonstrated control technology by a point source subject to the provisions of this subpart:

TABLE 2.—STANDARDS OF PERFORMANCE BASED ON THE BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGY

Effluent Characteristic	Standard of performance	
	Maximum for an yone day	
	mg/sq. m.	*lb/10⁴ sq. ft.*
Copper (Cu)	40	8.2
Nickel (Ni)	40	8.2
Chromium, hexavalent (Cr +6)	4	0.8
Chromium, total (Cr T)	40	8.2
Zinc, (Zn)	40	8.2
Cyanide, oxidizable (CN)	4	0.8
Cyanide, total (CN)	40	8.2
Suspended solids (SS)	1,200	246
pH	Within the range of 6.0 to 9.5	
	Standard of performance	
	Maximum average of daily values for any period of 30 consecutive days	
	mg/sq/m.	*lb/10⁴ sq. ft.*
Copper (Cu)	20	4.1
Nickel (Ni)	20	4.1
Chromium, hexavalent (Cr 6+)	2	0.4
Chromium, total (Cr T)	20	4.1
Zinc, (Zn)	20	4.1
Cyanide, oxidizable (CN)	2	0.4
Cyanide, total (CN)	20	4.1
Suspended solids (SS)	600	123
pH	Within the range of 6.0 to 9.5	

§ 413.15 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the electroplating of copper, nickel, chromium and zinc on ferrous, nonferrous and plastic materials subcategory which is an industrial user of a publicly owned treatment works, (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in 40 CFR, Part 128, except that for the purposes of this section 40 CFR § 128.133 shall be amended to read as follows: "In addition to the prohibitions set forth in section 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 413.14, 40 CFR Part 413: *Provided That,* if the publicity owned treatment work is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

[FR Doc.73-21231 Filed 10-4-73;8:45 am]

OTHER REGULATORY AGENCIES

The Additional information and data requested by the Departments of Health and Labor are included in the comments prepared for the Environmental Quality Board.

FINAL

ENVIRONMENTAL IMPACT STATEMENT FOR THE DIGITAL EQUIPMENT CORPORATION DE PUERTO RICO NEW PLANT AT AGUADILLA

REVISED NOVEMBER 1973

R. M. GUZMAN & ASSOCIATES
Consulting Engineers
San Juan, Puerto Rico

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SUMMARY

Digital Equipment Corporation de Puerto Rico (Digital), a wholly owned subsidiary of Digital Equipment Corporation (Digital U.S.), is planning to construct a plant in Aguadilla to produce sophisticated modular systems and other electronic equipment. The plant will provide employment to about 600 people at the start of operations. It will be the second plant to be established by Digital in Puerto Rico.

Digital started its Puerto Rican operations with a manufacturing plant at San Germán, which at present provides employment to 1,260 persons in the production of modular systems and printed circuit boards which are used in all Digital computers.

Digital is conscious that its operations will result in the generation of inorganic wastewaters which must be adequately treated and disposed of. Appropriate equipment is being provided to reduce the concentration of the metallic ions to a minimum.

The proposed plant will be located in Bo. Montana near Ramey Air Force Base, on a 55 cuerda farm close to PR Rds 459 and 467. The farm was recently bought by Fomento with the purpose of establishing an Industrial Park to provide extra jobs for the area, which has suffered recently by the announcement of the closing of the Ramey AFB. The proposed facilities will consist of a 130,000 sq ft floor space which will harbor the administration offices and assembling plant.

The Puerto Rico facility to be established at Aguadilla will represent a total capital investment of about $6 million. Annual expenditures of raw materials, packing materials maintenance supplies, office supplies, etc., are estimated at $4-6 million. Purchase of material will be made locally, whenever feasible or available from island sources.

Raw materials to be utilized are acids, bases, etchants, plating solutions such as electroless copper, copper sulfate, tin-lead fluoborate, gold or nickel-gold, and others.

Arrangements have being made with Fomento and Acueductos to provide 200,000 gpd of water. Other alternatives for obtaining the water demand were considered, such as bringing it from the filtration plant at Ramey AFB, constructing another filtration plant, and extending pipelines from the Aguadilla filtration plant.

Digital and Lancy Laboratories Inc., are designing a waste treatment system suitable for the plated-through-hole printing wiring board production which will meet, or exceed, anticipated EPA requirements for the new plant. When constructed, the process waste plant will be one of the most modern in the world for the treatment of wastewaters from the metal finishing industry. Water will be recycled whenever possible, while some metallic constituents will be recovered from the rinses. The treatment to be provided to the process wastes will be precipitated at pH between 8.4 and 9.0. These will go to a sedimentation tank for separation of the supernatant water and the solid fraction. The sludge will be removed by decant panels. Ion exchange is also being considered at this time for treatment of the process rinse waters. The domestic sewage will receive secondary treatment to obtain a reduction of 85-90 per cent of the biochemical oxygen demand and suspended solids.

Several alternatives were considered by the designing engineers for the disposal of wastewaters. These included disposal into the Aguadilla regional sewerage system. This alternative was not considered feasible as a short-term solution, as the construction of this system will not be terminated before 1978.

Other methods studied, and discarded, were discharging the treated effluents to Quebrada de los Cerdos, the closest surface body of water from the proposed plant site; discharge to the Ramey AFB biofiltration plant and disposal in a septic tank with tile field.

It appears that the best choice for a short-term solution for the disposal of the treated effluents is discharge into a natural sink-hole located on the plant premises. The sink-hole acts as a natural drain for the storm run-off.

There are no underground water resources in the Aguadilla area that could be affected by the discharge of these wastewaters through the sink-hole. It is believed, based on studies made at other areas with sink-holes, that the permeability of the near-surface limestone is so great that water quickly moves into the ground and laterally to the nearby sea.

The metallic ion most present in the process waste is copper, although it is possible that nickel, lead and tin may also be present in small concentrations. Digital plans to comply with the regulations proposed by the EPA in October 1973 for the metal finishing industry.

Air pollution problems from the proposed facility are negligible and limited to a small emission from a steam boiler at the process plant, which is used mainly to provide heat for the process waters. Kerosene will be used as fuel to minimize the emissions of sulfur dioxide and particulate matter.

Generation of solid wastes will mainly be due to office trash, cardboard and cafeteria wastes, and sludge to be recovered by scavengers. Total generation of solid wastes is estimated at 650 lbs per day, not including the metallic sludge from the process plant.

Alterations of the environment because of noise will be limited to the construction phase. There are 2-50 HP compressors, this being practically the only source of noise pollution.

There will be additional traffic as a result of the establishment of the plant. This will be more noticeable in part of PR Rd 2 and in PR Rds 459 and 467. The traffic flow will result in an added ADT of about 300 in the small rural routes.

All the necessary considerations are being taken for fire protection. There are several chemicals which will be adequately stored. Fire equipment is being designed to minimize any hazard and to assure complete safety as per the standards required by insurance companies. The guides of the National Fire Protection Association will be followed, as well as the Federal requirements for safety as defined by Occupational Safety and Health Act (OSHA).

The Digital plant will be built with the high standards that are used on the U.S. mainland in regard to quality of building materials, architectural design standards, pleasing and coordinated color schemes, acoustical treatment, landscaping, etc.

The environmental impact on water relates more to use of water, which will be committed to this industrial purpose. It is not expected that any underground waters, or coastal waters, will be affected by these operations.

The construction of the proposed plant will affect the terrestrial environment by altering its surface characteristics, and will firmly commit the site to industrial use for the life of the facilities, thus closing potential options on another possible use of the site. The plant, because

of its relative isolation, will not interfere with other man-made facilities such as roads, highway, power lines, etc. Neither will it interfere with any sites of natural, historic or scenic value.

The construction and operation of the Digital plant will have certain distinguishable economic and social effects upon the Aguadilla area. Not only the construction of the plant but also its operation will result in substancial economic benefits to the area through increased employment and trade. Municipalities such as Aguadilla, Aguada, Moca, San Sebastfan, Isabela, Mayaguez and others will benefit from these operations.

2. INTRODUCTION

On February 5, 1973 Mr. Teodoro Moscoso, Administrator of the Puerto Rico Industrial Development Company, delivered a radio message commenting on a Japanese firm that will establish a new plant in Puerto Rico. In his message, Mr. Moscoso indicated that Puerto Rico needs the establishment of industry that requires high employment and yet does not endanger the environment.

Digital Equipment Corporation de Puerto Rico (Digital), a wholly owned subsidiary of Digital Equipment Corporation (Digital U.S.), Maynard, Mass., is planning to construct in Aguadilla a plant similar to the one described by Mr.Moscoso in his recent radio message. The plant proposed by Digital will require the employment of many highly skilled people to manufacture by hand sophisticated modular systems (computers) and other electronic equipment.

Following the announcement of the closing of Ramey AFB as part of an overall program of the Department of Defense to abandon several military installations, Governor Hernández Colón announced at a press conference on April 17, 1973 that the Commonwealth government plans to reduce the economical impact on the area. In his press conference the Governor stated that Digital will establish a plant that will provide employment to about 600 people at the start of operations, with a possible employment of 2,000 in the future. It is felt that the establishment of the Digital plant at Aguadilla comes at a very good time, and will be of great help in reducing the economical impact in the area that the closing of the base will create. Appendix A shows the press reports following the press conference.

Digital (U.S.) is a relatively new corporation, organized 16 years ago, and considered one of the fastest growing corporations in the world. Digital (U.S.) is the world's largest producer of mini-computers, with manufacturing operations in the United States, Canada, Ireland, Taiwan and Puerto Rico. It provides employment to about 11,000 people.

Worldwide sales for Digital were $187,300,000 last year. Sales outside the United States during Fiscal Year 1972 reached $65,000,000, which accounted for about 35 percent of the total sales.

Digital (U.S.) makes a continuing commitment to an aggressive research and engineering development program. This year's research and development expenditure of $20,100,000 accounted for 11 percent of the net sales.

3. GENERAL INFORMATION

3.1 Existing Facilities in Puerto Rico

Digital (U.S.) started operations in Puerto Rico in 1968 and Digital in 1969, by establishing a relatively small plant in San Germán. The fast growth of the company and its increased sales made it necessary to obtain a larger building for the manufacture of the boards and modular systems. Digital increased its floor area by moving to a larger Fomento building. At this time, based on the success of the Puerto Rico plant and the working capabilities of the Puerto Rican worker, Digital plans to increase the capacity of the San Germán plant and at the same time construct another facility in Aguadilla. The new plant will manufacture products complementary to the products produced in San Germán.

The San Germán facility doubled in size from 60,000 to 120,000 sq ft. At the present time it employs 1260 persons in the production of modular systems (including PDP-8 family computer) and printed circuit boards for use in all Digital computers. The PDP-8 family computer was introduced in 1965 with the development of a minicomputer priced at $18,000. By contrast, today's PDP-8/F computer is priced at less than $4,000.

3.2 Purpose

Digital is conscious that their operations will result in the generation of inorganic wastewaters which must be adequately treated and disposed of. Appropiate equipment is being provided to reduce the concentration of metallic ions to a minimum. The plant is being designed to comply with the criteria established for this type of industry.

The objective of this Environmental Impact Statement is to provide a technical description of the proposed plant, to provide an assessment of

the potential environmental impact that will result from the construction and operation of the plant, and to make an overall assessment of environmental and socio-economical considerations.

The plant is being designed with respect to environmental considerations, having in mind the provisions of P.L. 92-500 of October 1972 to assure minimum impact on the environment. As stated in Section 304 (b) of the law, considerations is given to the degree of effluent reduction attainable through the application of the best practicable control technology currently available, taking into consideration the control measures and practices, and including considerations as to the total cost of the application of the available technology in relation to the effluent reduction benefits to be achieved. Non-water quality environmental impact is also being considered.

It is our aim that the proposed methodology and process herewith to be described will lead to the approval of the proposed project based on the benefits to the Puerto Rican as well as the National community, through the production of equipment that is a necessity for many people throughout the world. It is our intent that the construction and operation of the proposed Digital plant will be accomplished with the least effect on the local environment, and at the same time be beneficial to the economy of the Aguadilla region.

Digital will continue, after the plant is constructed, to make whatever changes in design, equipment and operation that will insure the minimum deterioration of the environment, complying with present and future regulations of the Environmental Protection Agency, the Environmental Quality Board, the Department of Health, and other regulatory agencies of

the Commonwealth of Puerto Rico. In fact, this has been the practice the San Germán plant.

3.3 General Description of Land

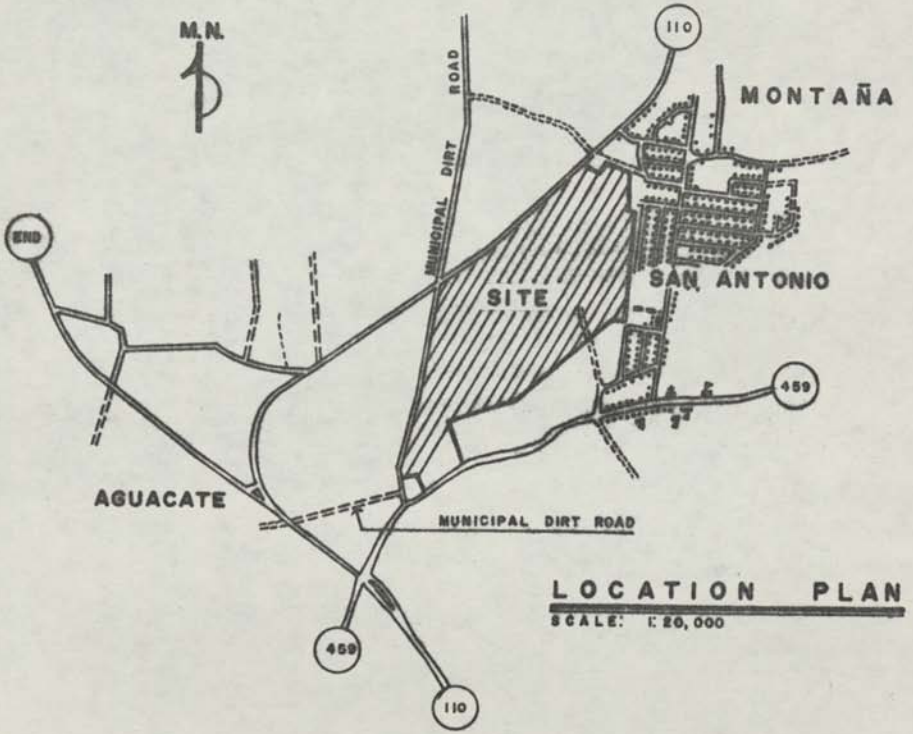
The Digital plant will be located on Bo.Montana near Ramey AFB on a 55 acre farm close to PR Rds 459 and 467. This land has never been used for agricultural purposes, although small farmers raise some cattle on the land. Its topography is plain. The farm was recently bought by Fomento with the purpose of establishing an Industrial Park to provide extra job opportunities for the Aguadilla area. Figure 1 shows the area in Bo. Montana where the Industrial Park will be constructed.

It is bounded on the north side by PR Rd 110; on the south by the properties of Sucn. Arreche, Angel Nieves, and the P.R. Industrial Development Company; also on the east by the P.R. Industrial Development Company; and on the west by a municipal road. The land comprises 222, 850.7064 square meters, which is equivalent to 56.6993 acres.

3.4 Description of Project

The proposed project consists of the construction of one building in which several types of special machinery will be installed for the manufacture of modular systems, circuit printers and other materials used for minicomputers and other electronic equipment manufactured by Digital.

Should authorization from the Planning Board, the Environmental Quality Board and other agencies of the Commonwealth of Puerto Rico be granted, construction will start immediately and will be completed within



LOCATION PLAN

SCALE: 1: 20,000

AGUADILLA INDUSTRIAL PARK

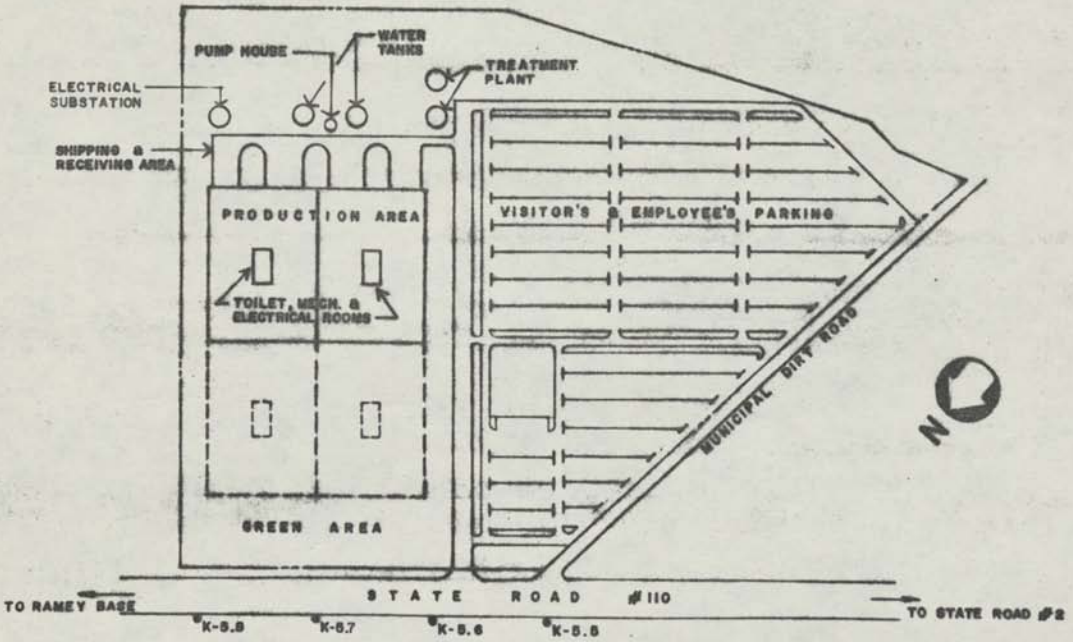
RAMON M. GUZMAN & ASSOC.

FIG. 1

by June 1974.

The proposed facilities will consist of 130,000 sq. ft. of floor space which will harbor the administration offices and the manufacturing plant. The parking lot will take 60,000 sq. ft. of the lot. Out of the 55 acres acquired by Digital, only 20 will be used for the first phase of the project. Figure 2 is a plot plan of the initial project, without considering future expansion.

Second phase of the project will require another 20 acres of land.



SCHEMATIC MASTER PLAN

RAMON M. GUZMAN & ASSOC.

FIG. 2

4. ECONOMIC CONSIDERATIONS

Aguadilla has a population of about 51,000 inhabitants, with approximately 183,000 inhabitants in the region. The labor force of the city is 15,200 and of the region 54,900, of which 29.3 percent are unemployed according to a report released recently by the Department of Labor. The available labor force in the city is 4,437, while it is about 37,500 for the region.

Because of the high unemployment force in the area, the Commonwealth government has decided to establish more industries in the area, projecting the construction of a small Industrial Park for the new industries, the first of which is Digital. In the past Aguadilla was known as a seaport, sugar grower, and manufacturer of straw hats. Nowadays Fomento is offering prospective industrial investors several facilities for establishing in the area.[1]

One of the reasons for the high unemployment at Aguadilla is the closing of the Ramey AFB, which used to be the main source of employment in the area. With the closing of the military facility, many people lost their jobs. The lack of industries in the area prompted the Government and Fomento to develop new jobs for the area.

Digital's Puerto Rico facilities to be established at Aguadilla will represent a total capital investment in excess of $6 million. About 125 Puerto Rican workers will be employed to construct the facility. Many island industries and businesses will provide the construction materials.

The plant will employ about 400-600 persons at the start of operations. When peak production levels are reached, the plant will employ about 600-1,000 persons, nearly all of them Puerto Ricans, with only a few from the parent company in Maynard. It is estimated that about 600-800

indirect jobs will be created for Puerto Rico and the Aguadilla region as part of this project. The annual payroll for plant only is estimated at $3 million.

Annual expenditures of raw materials, packing materials, maintenance supplies, office supplies, etc., are estimated at $6-10 million. Purchase of these materials will be made locally whenever feasible or when available from island sources.

The electric power expenditures will be about $240,000 per year, while the water bill will amount to about $18,000 year. Electric power use is 2500 KVA.

Digital will make a substantial contribution to the Aguadilla area and will help lower the unemployment rate while increasing the economic level of the are population.

Being in a technical field, Digital will provide facilities for training employees. Digital will also employ a high rate of technicians and specialists for its computer operations.

5. RAW MATERIALS AND PROCESS

The basic products to be manufactured are modular systems including circuit boards, etched circuit boards and sub-assemblies. The raw materials to be utilized are divided as follows:

5.1 Acids and Etchants (Acidic Materials)

These materials are used to descale, clean, remove oxide film, activate the work for subsequent metal deposition and in the case of the etchants, to remove excess copper metal from the circuit boards. These solutions will all contain dissolved metal from the work and or other toxic ions. These solutions include:

Sodium persulfate
Sulfuric acid
Hydrochloric acid
Catalyst
Accelerator
Nitric acid
Fluoboric acid
Ammoniacal etchant
Hydrogen peroxide

5.2 Plating Solutions

The plating solutions in use are:

Electroless copper
Copper sulfate
Tin-lead fluoborate
Gold and Nickel

Except for electroless copper these solutions are seldom discarded, but would be batch treated if necessary.

All process solutions containing significant quantities of metal ions or toxic non-metallic ions will be followed by an integrated treatment rinse. These integrated treatment rinses will perform the functions of adjusting pH, breaking metal complexes, or whatever is necessary to precipitate toxic ions. Each integrated treatment rinse will be continuously recirculated with enough retention time in a settling tank to settle its precipitate. The solid sludge will then be periodically removed

by a private contractor and disposed of at the Aguadilla Sanitary Landfill. Each integrated treatment rinse will be followed by a recirculating deionized water rinse to complete the critical rinsing works.

5.3 Storage

All the materials will be stored at the warehouse section of the plant, and will be carefully controled to prevent accidental misuse. Care will be taken to confine all storage areas and to prevent accidental discharges.

There will be a well ventilated chemical storage room. Floor drains will be provided in case of accidental spillage. The solvents and flammable materials will be stored in a flammable storage room.

Explosive-proof lighting and other safety materials will be used in the construction of these rooms. The floor drain will be constructed as to direct all spillage from the chemical and flammable room to the process waste treatment plant. Accidental acid spills will go to the strong acid storage tank at the process waste plant. All the Federal and Commonwealth government regulations in this respect will be strictly followed.

Table I indicates the chemical to be utilized and proposed storage.

5.4 General Process

The principal process to be used for the etched circuit boards and the plating-through-holes circuit boards is divided into the following main operations:

(1) Pre-Clean

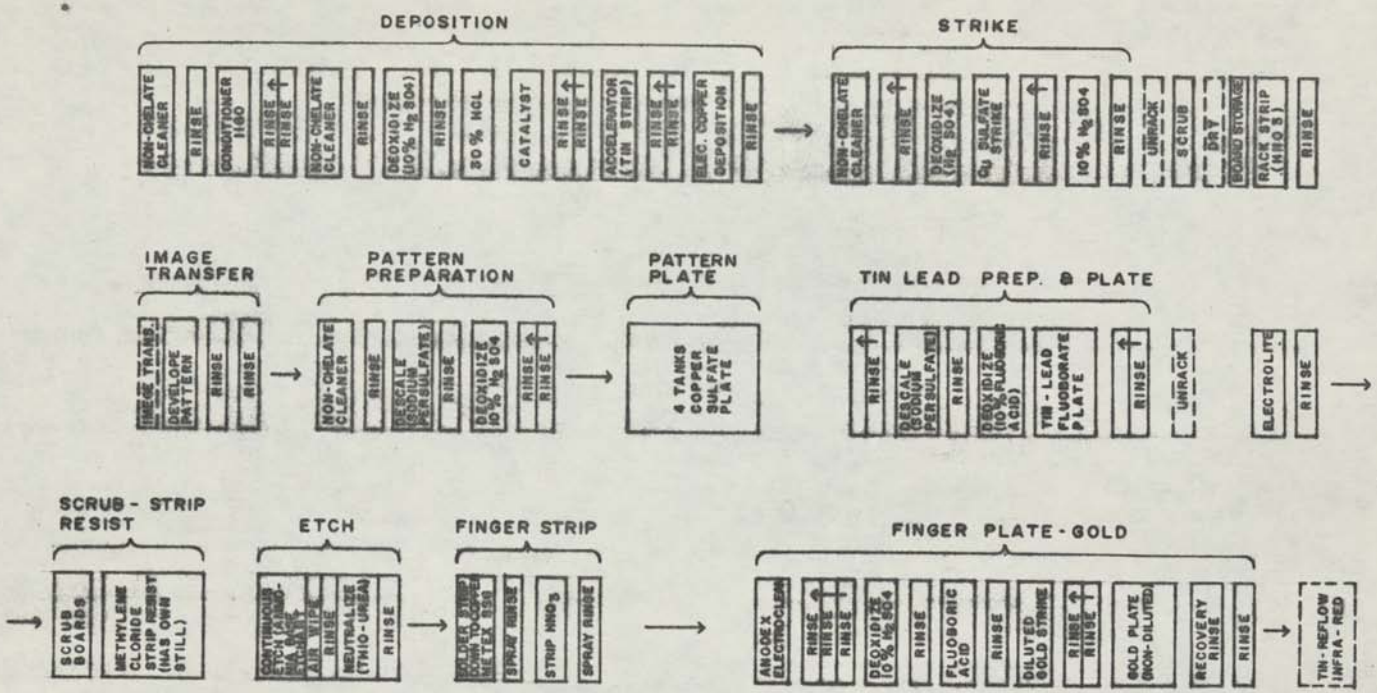
Wet abrasive deburr will be used in this part of the process. The metal is rinsed and the cascade rinse overflow will pass through an effluent filter.

(2) Plating-Through-Hole (PTH)

The PTH process consists of 9 distinct operations, during which the circuit boards are cleaned and plated with copper, tin-lead, nickel and gold. The existing arrangement of the production sequence is shown in Figure 3.

Prior to the deposition line, the holes are drilled into copper clad circuit boards, which are wet sanded and water blasted. The deposition line plates the walls of the drilled holes with a thin film of copper. The circuit pattern is photographically transferred to the boards in the image transfer step and then prepared for plating with copper. Only the circuit pattern is plated with copper, since all other areas are coated with a plating resist to prevent plating. After the circuit pattern is copper plated, it is further plated with a tin-lead (solder) layer. The boards are then scrubbed, and the resist coating is stripped from the boards. All unneccessary copper is etched off the boards in a converyorized etcher. The solder layer is stripped from the "fingers" (contacts at the edge of the circuit boards), and these are plated with nickel and gold.

A high temperature alkaline soak solution is used to remove dirt, oils, and grime from the boards in the deposition line. Descaling, or oxidizing is accomplished by a sulphuric acid-hydrogen peroxide solution. A hydrochloric acid batch acts as a protect step for the catalyst immersion, this consisting of a palladium and stannous chloride solution in hydrochloric acid. The mixture acts as a catalyst for the electroless copper on the non-conductive surfaces of the drilled holes. A proprietary solution of weak acids and various additives is used to accelerate the action of the catalyst



PTH OPERATIONS

PROPOSED PRODUCTION FACILITIES ARRANGEMENTS FOR PTH OPERATIONS

RAMON M. GUZMAN & ASSOC.

FIG. 3

by removing superficial stannous chloride.

The copper deposition tank electrolessly coats the nonconductive surfaces in the holes with a thin film of copper.

The pattern of the circuit is transferred to the circuit boards photographically. The boards containing the circuit pattern are cleaned, descaled, and deoxidized in solutions similar to those previously described. A copper sulfate electroplating solution deposits a layer of copper on the circuit pattern in the plate tanks.

Tin-load plating of the circuit pattern is accomplished by electroplating the boards in a tin-lead fluoborate solution. The boards are then unracked, and the racks are electrolytically stripped of the tin and lead deposited on them during the previous two plating operations.

The boards are scrubbed and then rinsed in a methylene chloride bath to strip the resit material. The methylene chloride stripper is provided with its own recirculating still so that no treatment of the spent stripper is required. A conveyorized etcher removes unwanted copper from the boards. After the boards are etched, they are air wiped, rinsed, neutralized and rinsed again.

The fingers are stripped of the tin-lead layer by immersion in an acidic solder stripping solution in the solder strip tank. An acid bath removes any tin and lead remaining after the rinsing.

The strong alkaline electrocleaner is then used to remove dirt and grime from the boards by chemical and electrical action.

A fluoboric acid tank is used to clean any remaining residue from the boards prior to the gold plating. The gold strike tank deposits a thin layer of gold on the fingers using a proprietary electroplating

gold solution and high electrical currents. The recovery rinse, which removes the gold residues from the boards, will discharge to a gold recovery cell.

The gold plating tank electrodesposits a dense, nonporous, semi-bright layer of gold on the finger contacts. A recovery rinse, which removes any gold residues left on the boards, will discharge to a gold recovery cell. The boards go through the reflow operation, which allows and evens the tin-lead layer, and then continue on for final inspection.

Following copper-containing baths, appropriate integrated chemical treatments will be used for neutralization of the drag-out film and simultaneous precipitation of the copper (similarly for lead), as insoluble copper oxides and hydroxides. These chemical treatment solutions will be circulated to reservoir tanks for clarification by sedimentation and chemical adjustment prior to return to the integrated chemical treatment wash station located in the process line, thus constituting a closed loop treatment. A small amount of blowdown will occur to keep salts from reaching saturation levels. Conventional water rinses follow the integrated chemical rinse to remove the small quantities of non-toxic ions. These subsequent water rinses will be purified and recycled for reuse. It is anticipated that part of the water will be recycled. Part will be lost in evaporation and blow-down of non-toxic ions.

6. WATER CONSIDERATIONS

6.1 Ground Water

Ground water is practically non-existent in the Northwest section of Puerto Rico. Records compiled by the U.S. Geological Survey indicates that there is very little ground water in this region, and no aquifer exists in the sub-soil of the Aguadilla area. None of the areas in the vicinity obtain water from deep well sources.

The Aqueduct and Sewer Authority has experienced difficulties in providing water for the rural areas in this sector. Because there is no deep well water, the urban water supply distribution system of Aguadilla has been expanded to provide service to the rural areas and nearby municipalities of Moca and Aguada. Because of this condition, Digital and the industries to be established by Fomento at the Industrial Park must depend on surface sources for their water needs.

6.2 Water Source

Digital plans to use about 200,000 gpd at the start of its operations. This water will be used for 8-hrs daily. Peak rate of use is estimated as 400 gpm. 95 percent of the total water requirements, or 190,000 gpd will be for processing, while the remaining 10,000 gpd will be domestic sewage from the plant employees.

The problem of supplying water to Digital is being shared by Fomento. This agency must also provide water for the development of the Industrial Park.

Considerations for water supply were studied on the basis of three alternatives, as follows:

(1) Ramey AFB Filtration Plant

Provide water from the Ramey AFB filtration plant, which is

located near km 2.0 of PR Rd 467 in Bo. Camaceyes. It would be necessary to connect to the 14-in pipeline which serves the AFB and to install about 4 km of 8-in pipeline first along RD 467 and then to PR Rd 459 to the Industrial Park. Estimated cost of the pipeline is $205,000.

(2) New Plant

The estimated water demand for the Industrial Park is 2.0 mgd when it is fully developed. This demand will require an additional water source. The Aqueduct and Sewer Authority has determined that the most economical way is obtaining water from the Aguadilla irrigation system, whose capacity is adequate for the 2.0 mgd needed.[2] In this case it would be necessary to construct a small dam in the irrigation channel at a point where the channel crosses PR Rd 459 in Bo. Arenales. The project requires also a new filtration plant, capacity 3.0 mgd, a 1.0 m.g. distribution tank, and the installation of about 4 km of 16-in pipeline from the filtration plant to the project site. Estimated cost of this project is $1.35 million.

(3) Extension of Pipeline from Aguadilla Filtration Plant

The Aqueduct and Sewer Authority agreed to provide upto 0.2 mgd to Digital by extending a line from the Aguadilla filtration plant. The whole project would require the installation of about 4 km of 8-in line & 16-in line from the 8-in line terminating at Bo. Montana, at an estimated cost of $205,000. It would provide the needed water for Digital and the other industries to be established at the Industrial Park. The cost of this project is being shared by Fomento and Digital.

The use of deep wells for additional water was also considered both by Acueductos and Fomento, but it was deleted based on the low probability of obtaining underground water in an area near the proposed plant site.

The source of water for this project is Acueductos. When the EIS was being prepared, consideration was given to several alternatives to obtain water. Digital, Fomento and Acueductos worked together and determined the best solution was to extend the Aguadilla pipeline system to the Industrial Park Site. An agreement has been made whereas Acueductos will install a pipeline comprising 16 inch and 8 inch diameter pipes to the Industrial Park Site. Other future industrial plants to be constructed near this site will also be able to use this water pipeline. Of the total cost of $205,000 for this pipeline project, Digital has contributed $103,000.

At the time the EIS was written, it appeared that the short term water demands were 200,000 gallons per day and the long term demand might be 500,000 gpd. These water volumes are in line with what normally would be expected from an electroplating facility of this size. Due to the rapidly changing state-of-the-art of metal finishing waste treatment, new Federal effluent standards, and as a result of pilot plant experiments in Maynard, it now appears that water for industrial uses will be less than 50,000 gpd. This reduction is due to the integrated treatment systems, DI water rinses, and other water re-use systems now contemplated for the project. This is equivalent to 90% recycling.

TABLE II

PHYSICAL AND CHEMICAL ANALYSIS OF
AGUADILLA PUBLIC WATER SUPPLY

Sample from:
Aguadilla Filtration Plant

Date: July 12, 1971

CHEMICAL CONSTITUENTS:	EXPRESSED AS:			LIMITS U.S.P.H.S.*
Free Carbon Dioxide	CO_2	5.0	Mg/1	
Dissolved Oxygen	O_2	- -	Mg/1	
Residual Chlorine	Cl_2	0	Mg/1	
Calcium	Ca	44.0	Mg/1	
Magnesium	Mg	38.9	Mg/1	
Sodium and Potassium	Na	20.9	Mg/1	
Total Iron	Fe	.03	Mg/1	0.3 Mg/1
Dissolved Iron	Fe	0	Mg/1	
Manganese	Mn	0	Mg/1	0.05 Mg/1
Oxides	R_2O_3	- -	Mg/1	
Silica	SiO_2	6.0	Mg/1	
Total Alkalinity	$CaCO_3$	106.0	Mg/1	
Ph. Alkalinity	$CaCO_3$	0	Mg/1	
Carbonate	CO_3	0	Mg/1	
Bicarbonate	HCO_3	129.3	Mg/1	
Sulfate	SO_4	6.0	Mg/1	250 Mg/1
Chloride	Cl	16.0	Mg/1	250 Mg/1
Nitrate	NO_3	0.1	Mg/1	45 Mg/1
Nitrite	NO_2	0	Mg/1	
Fluoride	F	0.5	Mg/1	1.0 Mg/1
Phosphate	PO_4	0	Mg/1	
Sulfide	S	0	Mg/1	
Total Dissolved Solids Residue at	103°C	159	Mg/1	500 Mg/1
Loss on Ignition at	600°C	66	Mg/1	

PHYSICAL CHARACTERISTICS:

Turbidity	SiO_2 Stds.	3 Units	5 Units
Color	Pt-Co Stds.	0 Units	15 Units

OTHER DETERMINATIONS:

Total Hardness 122.0 Mg/1 Non-carbonate Hardness 16.0 Mg/1
Conductivity 300 Micromhos
pH 7.61 Saturation pH 7.71 Saturation Index -0.10

Bacteriological Examination: M. P. N. Per 100 Ml (Coliform Group)

*Maximum limits for drinking water established by the U.S.P.H.S. in 1962.

7. TREATMENT AND DISPOSAL OF WASTEWATERS

At this time Digital and Lancy Laboratories, Inc., of Zelienople, Pa., are designing a waste treatment system suitable for plated-through-hole printed wiring board production which will meet, or exceed, anticipated EPA requirements for new plants and general standards for the year 1983.

As the economy of the manufacturing process is affected, the operating costs are of great importance in the selection of the methods to be utilized by Digital, as well as for all the metal finishing industry. Process solution regeneration, chemical recovery, water reuse and water savings, good housekeeping and other factors will be taken into consideration.

The methods being studied or to be used by Digital includes metal recovery, water reuse, precipitation and removal of metallic ions, and ion exchange.

7.1 Recovery of Metals

The electrolytic recovery of metals will be done at the Aguadilla plant. Of course, gold is expensive and it is necessary to prevent its waste through the process waters. A dragout solution is maintained as a suitable electrolyte to allow the continuous recovery of the metal in the process and maintenance of the electrolytic system at such a level that the dragout loss of the metal into the following treatment wash system is of negligible economical consequence. No gold or tin ions are expected to be discharged through the process wastes.

Metals recovery, specifically gold, copper and tin/lead alloy, will be used to reduce treatment chemical's cost and the associated sludge handling and disposal cost resulting from conventional treatment. In addition, recovery provides an economic return of metals in their most valuable form for reuse.

In all cases metals recovery will be affected via electrolytic cells in which the metals are deposited on the catodes from which they are peeled off once a coating of adequate thickness deposits on them. The recovered metals are either returned directly to the process.

7.2 Treatment of Process Wastes

Continuous treatment will be provided for the process waste to insure that the metallic ion contaminants are taken out of the liquid. The rinse water effluents that contain metallic ions will be treated in the process line utilizing the integrated treatment systems. Although several methods are being studied by the consulting engineering firm for the waste disposal of the remaining wastes which are not taken care of by integrated treatment for metal waste disposal, the metallic ions and rinse water streams will be separated according to the treatment requirements for their precipitation.

The segregated streams will go to a tank. This tank is provided with mixing apparatus, automatic pH control, and enough detention time to assure the removal of the floating fraction of metallic hydroxides that tend to float because of low density.

The streams containing copper and nickel will be conducted by pipelines to a mixing tank, where sodium hydroxide will be added to obtain a pH between 8.4 and 9.0. This will insure the precipitation of both metallic ions in hydroxide form. Streams that may form a copper complex difficult to precipate, even at high pH, will be separated to prevent interference with precipitating reactions.

In order to prevent the escape of suspended solids containing metallic oxides, coagulation with an accepted polyelectrolyte will be provided. This will insure a heavy precipitate that will settle readily. Digital has already started making tests to determine the most suitable polyelectrolyte for use at the plant.

The mixed effluent will pass to a sedimentation tank, where the precipitates will settle. The effluent will be discharged through a pipe, while the sludge, consisting of metallic oxides, will be processed for the

separation of the liquid and solid fractions.

7.3 Domestic Sewage

The proposed domestic wastewater treatment plant is of the extended aeration activated sludge type. It is a Smith & Loveless Model V with an aeration tank capacity of 45,000 gallons and a clarifier with a surface area of approximately 230 square feet. In addition, treatment is preceded by a comminutor and followed by chlorination. The actual flow is expected to be approximately 25,000 gallons per day based on 900 employees first shift and 300 employees second shift along with a cafeteria. Complete drawings and specifications are available from the office of Victor M. García Associates.

7.4 Water Recycle

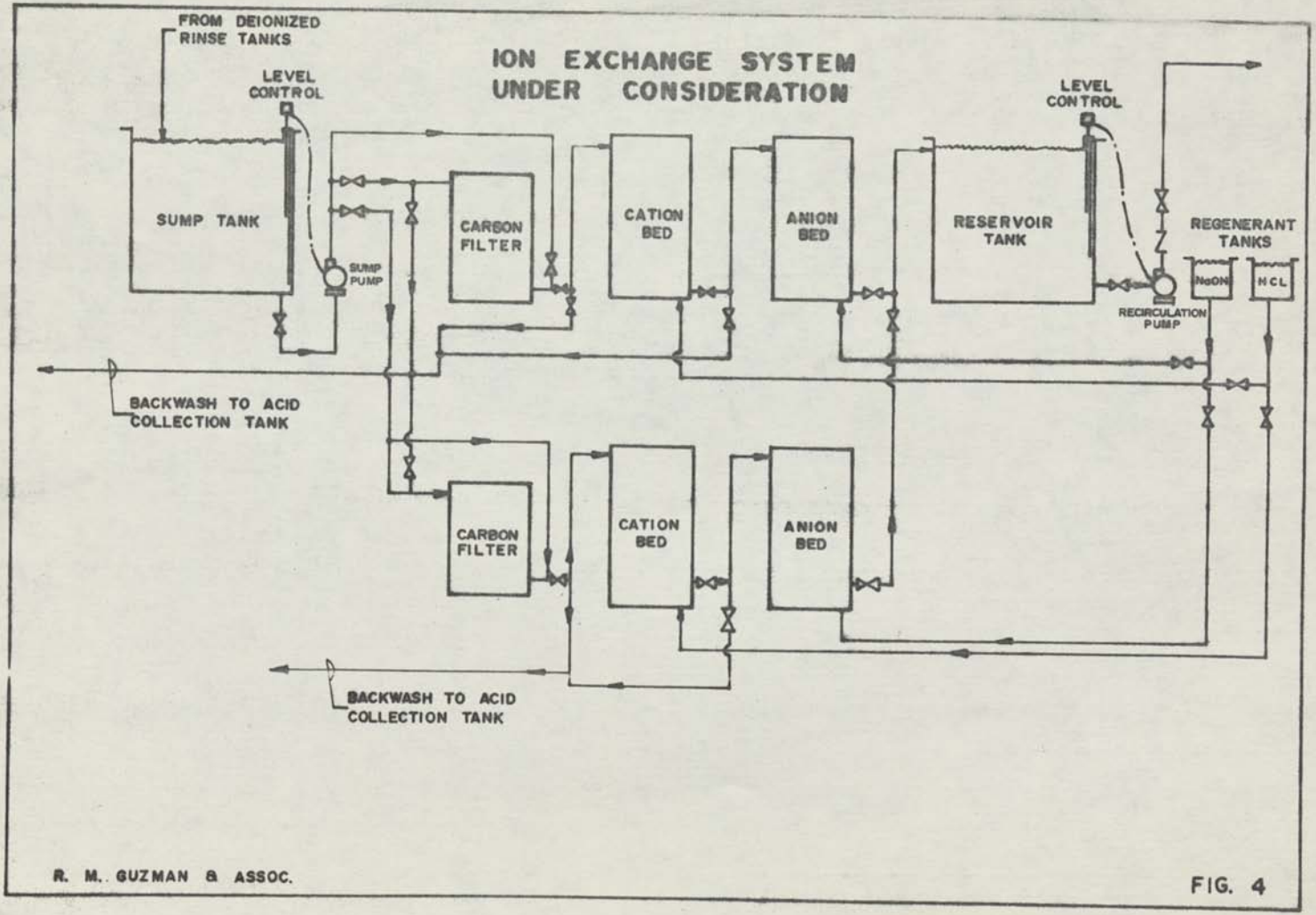
Consideration is being given in the design of the plant to re-use as much water as possible. The re-use of water will result in a reduction on the water demand.

The slightly contaminated DI rinse water will be collected from the various locations in the plant and be recycled through the deionizer for purification and re-use as high-quality water for various rinsing operations.

7.5 Ion Exchange

Consideration is being given to the use of ion exchange systems. This is a good method for the recovery or regeneration of process solutions.[3] The rinse waters can be passed through cation and anion exchange colums. The system may serve the function of recovering the valuable metals by removing the impurities. The ion exchange system backwash will go to waste treatment.[4] Figure 4 shows the ion exchange system being studied.

Deionized water will be used for critical final rinsing treatments to minimize the presence of conductive salts in the evaporated rinse water films remaining on the printed circuit boards. A two-bed anion-cation type of ion exchanger will be used for purification of the contaminated DI water. In order



R. M. GUZMAN & ASSOC.

FIG. 4

to supply the desired 25 gpm flow of DI water for production usage, a dual anion-cation exchanger system will be used. In this way one deionizer will deliver the full flow, while the second unit is being regenerated. Backwash from the carbon filters and deionizers will be sent to the treatment area for neutralization and precipitation.

The relatively clear supernatant liquid from the decant panel goes to a pH adjustment tank and eventually to the tube clarifier.

7.6 Integrated Treatment System

All toxic rinse waters will be treated on an individual basis using the integrated treatment system. Since the treatment rinses in this system are recirculated, they are never dumped except for periodic blow-down of metal oxide sludge.

In these systems, toxic dragouts from the plating baths are treated at the source using chemical rinsing instead of conventional water rinsing, thereby effecting a reduction in process water consumption. The dragouts from the plating baths are neutralized "in situ" by the addition of treatment solutions. This precipitates the heavy metals, and allows for their removal by settling. The system keeps the dragout from the various plating operations from contaminating subsequent rinse waters.

The arrangement of the equipment is such as to provide the addition of the treatment chemical, usually an alkali, directly to the treatment solution, and to provide recirculation of the treatment solution.

Through this system it becomes posible to recycle and reuse most process rinse waters and deionized waters, with savings of 90% in process water consumption. This has been confirmed by the prototype evaluation conducted by Lancy Laboratories. Only about 20 G.P.M. of effluents are expected to result from the operation of the plant.

It should be mentioned that the integrated treatment systems is considered to be one of the "best practicable control technologies currently available" (BPCTA) for the electroplating industry, as per a 1973 study made by Battlte for E.P.A.

A mixing tank will be used for the treatment of spent process solutions, accidental floor spillage, and deionizer back wash and regenerant rinses. The tank will be provided with a mixing apparatus, automatic pH control, and enough detention time to assure the removal of the floating fraction of metallic hydroxides that tend to float because of low density.

The principle involved in the operation of this unit is that the solubility of copper, nickel, zinc, chromium, tin, and lead is less than 0.1 milligrams per liter at pH values from 8 to 9.

In order to prevent the escape of suspended solids containing metallic oxides, coagulation with an accepted polyelectrolyte will be provided. This will insure a heavy precipitate that will settle rapidly.

The mixed effluent will pass to a sedimentation tank where the precipitates will settle. The effluent will be discharged through a pipe, while the sludge, consisting of metallic oxides, will be processed for the separation of solid and liquid fractions jointly with the sludges from the integrated treatment systems.

The results obtained in the prototype evaluation of the process conducted by Lancy Laboratories show that the process effluents are anticipated to have the following characteristics:

Total Effluents - about 20 gallons per minute

Copper - less than 0.5 mg/liter

Tin - less than 0.5 mg/liter

Lead - less than 0.5 mg/liter

Cyanide, amenable to chlorination - less than 0.02 mg/liter

C.O.D. - less than 50 mg/liter

Color and odor - none

Suspended solids - less than 20 mg/liter

pH -approximately 9.0

Once the plant is in operation its performance will be followed through proper monitoring and analysis of the effluents.

7.7 Floor Spills

All floor spillage will drain to sump pits and will be pumped to the floor spill collection tank where the pH will be automatically adjusted to a minimun value of 8.0. When sufficient volume to warrant treatment has accumulated in the floor spill collection tank, it will be transferred to the floor spill batch treatment tank and treated manually.

7.8 Inorganic Sludges

The sludges resulting from the proposed treatment consist essentially of metallic hydroxides containing 95 to 99 percent water, depending on the metal, the precipitation conditions and the clarifier. Sludges with this high water content are voluminous and difficult to dispose on municipal sanitary landfill sites. Extended settling times are helpful, but require extensive areas for compacting, evaporation, and drying. Pressure filtration has not been satisfactory because the gelatinous nature of the hydroxides rapidly clog, or bind, the filter membrane.

Most of the processes will invoice the recirculation of water and the resultant sludges will be high in solids content. In those areas where the sludge would be high in water content, a decant panel is proposed to dewater the sludge.

The decant filter or panel is a patented device consisting of a holding tank with an inner suspended hollow panel near the top, covered

d. Additional information as to houses in the area.

e. Exposure time of the workers to the machines, as source of noise pollution.

V. Miscellanous Comments

The process of electroplating involves the possibility of occupational health hazards because of the emissions of inorganic and organic vapors. Because of this reason, the Department of Health recommends the following security measures that should be taken into consideration should the project is implemented.

1. An adequate ventilating system to remove all the emissions of polluting substances in one of the electroplating tanks containing chromium.

2. Adequate general ventilation of the work area.

3. Provide safety equipment, as gloves, aprons, eye-wash, safety showers, safety glasses, rubber boots and safety shoes.

4. Periodic medical examinations should be done to the plant employees who are exposed to potential hazards.

5. Stric security measures should be taken at those areas where flamable liquids are used.

Carlos Jiménez Barber
Executive Director

with a filter membrane. The watery sludge is pumped to the holding tank as a slug. It is not a continuous filter flow. The heavy metal hydroxides quickly settle to the bottom, leaving a relatively clear supernatant. The supernatant seeps through the filter membrane to the hollow cone, leaving behind heavy metal hydroxides which compact on the bottom. When several feet have accumulated, the panels can be pumped to drums for removal by commercial scavengers.

The relatively clear supernatant liquid from the decant panel goes to a pH adjustment tank and eventually to the tube clarifier.

Since only a few feet of head can be applied to the membrane, the binding tendency is eliminated and a simple hosing of the filter surface restores the porosity.

7.9 Developer

This material is used to develop the image transferred to the circuit boards. Since the developer solution consists largely of organic material, the subquent running rinse will be directed to the pH adjustment tank in the treatment plant discharging to the sanitary sewer. Figure 5 shows the process waste streams.

7.10 Alternatives for Disposal of Wastewaters

Several alternatives have been considered for the disposal of the process and domestic wastewaters. The main difficulty is that at this time there is no sewerage system near the site or Fomento's projected Industrial Park. Both Fomento and Digital and their consulting engineers have been working to find a solution for the final disposal of the wastewaters. Alternatives are as follows:

(1) Aguadilla Regional System

Discharge into the Aguadilla regional wastewater treatment system. Although this is the best alternative, it is only a long term solution, as the Digital plant will be in operation within one year while it will take at least 5 years for the Aguadilla system to be completed. The Aguadilla plant is being designed by the consulting engineering firm of R. A. Sarriera and Associates. Scheduled completion date for the design is 1976, and it probably will take 2 additional years to complete.

(2) Quebrada de los Cerdos

The process waste could be treated to meet EPA standards to discharge into the Quebrada de los Cerdos, the nearest surface body of water from the plant site. This small creek is about 6 km from the plant. This alternative is considered a poor choice, as the construction of the pipeline through rocky land would be expensive.

(3) Ramey AFB Biofiltration Plant

There are several disadvantages in this alternative. The Ramey AFB plant has a capacity of 1.01 mgd, and the 8-in line to the plant is flowing at 80 percent capacity. The lift station cannot take any additional wastewater, as indicated by the resident engineer of the

AFB. Further permission for the use of the facility is subject to cancellation on short notice.

(4) Septic Tank with Tile Field

This is not a good choice, as the process waste is inorganic. This alternative was considered a temporary solution until the Aguadilla regional wastewater system is constructed.

(5) Sink-Hole on the Plant Premises

This appears the best alternative for the final disposal of the process and domestic wastewaters until the regional sewerage system is completed in about 1978. There is a high, huge, 7-ft diameter natural sink-hole on the land which acts as a natural drain for storm run-off. In fact, the land never floods in this area mainly because of the natural passage of the run-off through the sink-hole.

Consideration has been given to making tests with dyes, radioactive material or salts to determine the probable path of the waters going through the sink-hole. This, however, has been impossible because of the lack of water at the site. A considerable amount of water would be needed to make the test. Tests using common salt have been used previously for the discharge of wastewaters into sink-hole.*

*The most complete test in this respect was made several years ago by the Aqueduct and Sewer Authority for the design and construction of the Florida wastewater treatment plant. There are no creeks nor surface waters in the vicinity of Florida, thus it was necessary to provide complete treatment to the domestic wastewaters and determine if the effluents discharged through the sink-hole might contaminate the underground water sources. The test was conducted by passing water through granular salt for three days, and observing the chloride-ion concentration in the public water supplies of Florida, Barceloneta, Cruce Dávila and Manatí. Previous background information was compiled as to the chlorides in these supplies. No increase in the clorides was observed in any of these systems after the three day test. This was an indication that the wastewaters discharged through the sink-hole would not reach any of the public underground water supplies being used by the Authority.

It was our intent to perform dye tests to absolutely determine the ultimate discharge of the sink-hole. However, sufficient water was not available at the site to perform these tests.

It should be considered that studies made by the U.S. Geological Survey indicate little chances of an aquifer in the area * and that there are good technical reasons to believe that the sink-hole discharges to the ocean . Digital proposes to conduct the dye tests at a later date when sufficient water is available at the site.

There are no underground water resources at the Aguadilla area, and there are no plans, either by the Aqueduct and Sewer Authority or by industry to utilize underground sources. Although it is impossible to adequately predict where the water discharged through a sink-hole eventually goes, it does not appear that these would reach any underground source of water being used. The most logical reasoning is that these waters eventually reach the nearby ocean, which claims about 780 mgd of underground untapped water.

Geologists have determined that there is a head from south to north of the underground water resources of Puerto Rico that make them travel in that direction. Should this theory hold true, then it is possible that the waters discharged into the sink-hole at the plant premises will likely reach the north coast of Puerto Rico, without affecting any underground source, if any exists.

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* Fomento had proposed Acueductos to conduct a joint project for obtaining deep-water in the area. Acueductos did not wanted to enter into this venture because of little possibilities of obtaining the ground water. The project was going to be done at a cost of about $100,000 to be shared by both Government agencies.

Digital proposes to provide complete treatment to the process waste and to discharge its effluent into the sink-hole. A flocculation chamber and a clarifier will be provided to treat the inorganic process wastes. The proposed industrial wastewaters treatment systems include integrated treatment; batch treatment; electrolytic recovery with independent electrolytic cells for the recovery of copper, tin, lead and gold; and conventional chemical precipitation and clarification. In addition, there will be deionized water rinses to reduce the volume of discharge from this facility. This treatment system comprises many of the most modern waste treatment techniques, is highly efficient, significantly reduces the volume of water normally expected in an electroplating facility of this size and results in an effluent satisfying not only the proposed 1977 EPA Standards, but the 1983 Standards as well. Attached are some exerpts from the Environmental Protection Agency which further describe the proposed waste treatment systems.

The domestic wastewaters will be treated to obtain a reduction of at least 85 percent in biochemical oxygen demand and suspended solids, as required in the EQB's Proposed Regulations for Water Pollution Control, November 1972, and P.L. 92-500 of October 1972, as interpreted for the definition of secondary treatment.[5] This effluent will likewise be discarded to the sink-hole.

7.11 Geology of Sink-Hole

Studies made by the U.S. Geological Survey in San Juan indicates that the rocks consist mainly of Aymamon limestone, Aguada limestone, Cibao Formation, which is iterbedded marl, chalk and limestone.[6]

Krarst features develop where water containing carbon dioxide has been able to move on and through carbonate rocks and to remove some of the rock in solution. Although the extremely high permeability of some carbonate rocks results in high yields of wells in other areas the high permeability causes the water to drain quickly out of the region or to great depths. In

Bermuda, for example, the permeability of the near surface limestone is so great that water quickly moves into the ground and laterally to the sea, and only a thin sheet of fresh water lies on the basal salt water.

Terciary limestone are widespread ~~on~~ in Puerto Rico. The island was uplifted many hundred of meters above sea level during Miocene time and the limestones have been continuously krastified since then. Because of the topographic relief is great and the climate is humid-and tropical, solutional erosion and attendant land collapse have resulted in deep sink-hole and pronounced conical hills, which combine to make the terrane difficult to cross. Soils are thin, especially on upland slopes. The water table is deep below upland areas, and large caverns in the unsaturated zone transmit storm waters to openings, such as sink-holes, in the lowland, where flooding may sometimes occur. Because the permeability of the carbonate rocks is unevenly distributed, the yields of wells range greatly. Large amounts of fresh ground water are discharged to the sea, while some inland areas are short of water because the runoff quickly infiltrates to the subsurface by way of the intricately dissected surface.[7]

7.12 Future Considerations

It is recognized that more stringent limitations with regard to effluent quality may be imposed by the U.S. Environmental Protection Agency and the Environmental Quality Board in the near future. Consideration has been given to these possible restrictions, even though the specific values are still uncertain at this time. At such time Digital will modify their practices and treatment as required to comply with the revised standards.

8. EFFLUENT CRITERIA

In November 1972 the Environmental Quality Board prepared its proposed regulations[8] for the control of water pollution. The standards defined for effluent copper discharged into lakes or reservoirs, Sec. 6.6.2 of the regulation, require a copper concentration of 0.02 mg/1. The standard for drinking water accepted by the U.S. Public Health Services for copper is 1.0.[9]

The Environmental Protection Agency, following a study made under Contract No. 68-01-0592, prepared a Draft development document for effluent limitation guidelines and standards of performance for the electroplating industry, covering copper, nickel, chromium and zinc ions [10]. Based on this report, the Administrator of EPA published on October 5, 1973 the Effluent Limitations Guidelines and Standards of Performance and Pretreatment Standards for Electroplating Point Source Category[11], as directed by P.L. 92-500, Sect 304(b). Table III indicates the effluent limitations as proposed by EPA.

It should be observed that the proposed limitation of 40 mg/sq m of surface area as a maximum average of daily values for any period of 30 consecutive days is 50 times less restrictive that the proposed value as suggested by the EQB in its November 1972 standards. The EPA proposed regulation permits a mixmum of 80 mg/sq m for maximum value for any one day*. Because of these considerations, it is possible that EQB would revise their standards in the light of the new EPA proposed effluent limitation for this type of process waste.

*The proposed effluent limitation value of 40 mg/sq m of surface area is equivalent to about 1 mg/1. It is the purpose of EPA to define the effluent limitation in terms of surface area rather than concentration of the metallic ions to prevent industry from attaining the required standard by dilution. This approach is being followed by EPA in all of its new effluent guidelines. It is hoped, too, that the EQB will follow the same reasoning in this respect.

Nickel is another metallic ion that may be present in the process waste from Digital. The EPA parameter suggested is 1.0 mg/l for plants to be established. The proposed EQB regulations do not set a parameter for nickel.

9. STORM RUN-OFF

Being a rural area, there is no storm sewer collection system at the site or near it. The area rarely floods, mainly because of the location of the sink-hole. The drainage system of the plant will be constructed so that the storm waters follow the natural drainage patern of the land, thus these waters eventually will go through the existing sink-hole. There will be no decantation ponds for the run-off. The natural drainage of this land will serve for this purpose.

TABLE III

EFFLUENT LIMITATIONS GUIDELINES REPRESENTING THE DIGREE OF EFFLUENT REDUCTION ATTAINABLE BY THE APPLICATION OF THE BEST PRACTICAL CONTROL TECHNOLOGY CURRENTLY AVAILABLE (Phase I, October 1977)

Effluent Characteristic	Effluent limitation Maximum for any one day	
	mg/sq. m.	lb/10°sq.ft.
Copper (Cu)	80	16.4
Nickel (Ni)	80	16.4
Chromium, hexavalent (Cr^{+6})	8	1.6
Chromium, total (Cr_t)	80	16.4
Zinc, (Zn)	80	16.4
Cyanide, oxidable (CN)	8	1.6
Cyanide,total (CN)	80	16.4
Suspended solids (SS)	2,400	491
pH	Within the range of 6.0 to 9.5	

	Effluent limitation Maximum average of daily values for any period of 30 consecutive days	
	mg/sq. m.	lb/10°sq.ft.
Copper (Cu)	40	8.2
Nickel (Ni)	40	8.2
Chromium, hexavalent(Cr^{+6})	4	0.8
Chromium, total (Cr_t)	40	8.2
Zinc, (Zn)	40	8.2
Cyanide, oxidizable (CN)	4	0.8
Cyanide, total (CN)	40	8.2
Suspended Solids (SS)	1,200	240
pH	Within the range of 6.9 to 0.5	

10. AIR POLLUTION CONSIDERATIONS

Two boilers, each 95 hp, are expected for this process and one is a spare. A boiler operating under load will consume less than 30 gal per hr of light oil. Burning 0.5 percent sulfur kerosene this must be considered a"minor source" according to the definition of the Environmental Quality Board as indicated in the Regulations for the Control of Air Emissions.

The boilers are Cleaver Brooks fire-tube. The design pressure is 15 psig. The vent stack will have a diameter of 12 in. It will operate with a 15 percent excess air. Stack height is 20 ft.

The kerosene will be introduced around the periphery of the burner at the front, and be throughly mixed through vortex mixing vanes at the throat with a primary combustion air supplied by a blower mounted integrally with the burner.

Maximum rate of kerosene feed will be 30 gal per hr. The vapors going out the stack will consist mostly of hot air, water, carbon dioxide, sulfur dioxide and other gaseous products of combustion. Since the products of combustion are inert, and since the amont of kerosene to be burned is small, it is considered that no emission control equipment is necessary. The boiler will be operated only for about 8 hrs daily.

11. SOLID WASTES

Solid wastes will be generated from the packing materials and from the process waste. The wastes from the packing material will consist of paper and plastic, while the process waste will generate sludge, mainly metallic hydroxides. Estimated generation of solid wastes is 2,000 lbs. per month for the packing material. No reasonable estimate can be made of the sludge at this time, as it must be determined by plant experience and the effluent standards to be promulgated, although it can be stated that will be about 1,300 gal per month.

Solid waste generation and disposal are indicated in Table IV.

TABLE IV

GENERATION OF SOLID WASTES
(After Operations)

Type	Method of Disposal	Quantity Lbs/day
Office Trash	Contract	50
Cardboards	Contract	500
Cafeteria	Contract	100

1,300 gal/mo of sludge to be recovered by scavengers

There will be no incinerator for the burning of trash. It is proposed to make a contract with a private company. All solid wastes will be collected and stored in closed containers. A private contractor will pick-up and dispose of the wastes. The firm to be contracted must be approved to conduct this type of business according to the laws regulation of the agencies of the Commonwealth of Puerto Rico.

Once the plant is in operation, solid wastes from the offices, cafeteria and packing wastes will be processed through stationary compaction equipment before ultimate disposal at the Aguadilla sanitary landfill. This equipment will include a shredder, a compactor, and a closed 30 yd. container.

The thickened and dewatered sludge will be pumped to drums or to a tank truck for haul-away and disposal as sanitary landfill. Previous experience has indicated that this sludge, which is primarily hydroxides and oxides of copper, lead, tin and nickel, is very insoluble, and has not contaminated water sources. In addition, Digital is discussing with some scavengers and refiners in Puerto Rico, the possibility of recycling or reclaiming this waste.

HYDROGEOLOGIC INVESTIGATION AT DIGITAL'S PLANT SITE AGUADILLA, PUERTO RICO

INTRODUCTION

The present geologic investigation was conducted at the request of Engineer Ramón M. Guzmán, Consultant Sanitary Engineer for the Digital Equipment Corporation.

The purpose of the investigation is to determine the hydrogeologic conditions regionally and at the project site, placing emphasis on the capability of an existing cavern or sinkhole (cave-in) to assimilate the imposition of a discharge of thousands of gallons of water daily derived from treated wastes and unretarded run-off.

The run-off or discharge will originate at three (3) main points:

a. From imperivious surfaces or build-up areas within the Digital's property.

b. From treated sewage and industrial wastes, all originating within the Digital's property and from Digital's operations.

c. From natural ground run-off.

The existing sinkhole and cave was penetrated and studied to determine its capacity to assimilate the proposed unretarded run-off and waste discharge.

An inventory of the water wells in the region was made and scientific editing and interpretation of available literature on ground water resources was also conducted.

The study comprised geologic field work, the evaluation of pertinent climatological and pedological data, and analysis of related literature of the underground hydrologic resources of the region.

SCOPE OF THE PROBLEM

The Digital Equipment Corporation shall occupy part of a 55 acres farm in the municipality of Aguadilla (See location map). The topographic configuration of this property consists of gently to undulating coastal terraced terrain interrupted occasionally by typical limestone ridges and sinkhole, caved-in chambers or basin-like depressions resulting from water solution of the underlying limestone terrain.

Due to the absence of a main trunk system that can adequately dispose of storm runoff and treated wastes, the Digital Corporation has proposed the use of a deep natural depression or caved-in chamber as a drain outlet for 200,000 gallons of waste waters originating in the course of its daily operation. Digital is also proposing to use the sinkhole as a storm drain outlet of storm run-off collected in approximately 130,000 sq. ft. of impervious surfaces or built-up areas. These sources shall constitute, for all practical purposes, the watershed whose unretarded run-off will be inpounded into the sinkhole. Thus, the following analysis will be aimed at determining the capacity of the sinkhole to received this unretarded, run-off; the hydrogeologic condition of the region and possible adverse environmental effects resulting from the discharge will also be discussed, on the basis of convenience, with the original proposal.

SURFACE SOIL

Locally, the upper Aymamon limestone is overlain by a loose to semi-consolidated reddish brown to grayish brown sandy clay loam. This soil horizon is derived from old marine sediments and a mixture of material washed from the upland.

The surface soil layer is deficient in nitrogen and phosphorus. Irrigation is required during certain parts of the year especially during the period of February-June. The material , below 18 inches in depth, is relatively stiff and compact that it interferes with the normal development of roots and the percolation of water.

The soil horizon is irregular in depth but a maximum horizon of 18 feet was located at the Digital plant site before reaching the limestone basement.

Spots of fine loose sand intermixed with silt were noticed sporadically over the dominant clay loam surface soil.

LOCAL GEOLOGY

At the wave-cut terrances which characterizes the flat to undulating topographic setting of most of the northcentral to northwestern coastal plains of Puerto Rico, a medium bedded rather marly limestone unit, known as upper Aymamon limestone, outcrops uniformly throughout.

At the locality of the Digital's property, near the community of San Antonio,the true limestone horizon is covered with an irregular veneer of gray-brown to reddish-brown sandy clayey soil and some limestone debris. Boring information indicates that the thickness of the unconsolidated soil horizon varies between two (2) to eighteen (18) feet. Underneath the semi-consolidated soil lies a horizon of weathered, chalky to marly limestone, friable in competence.

The Aymamon limestone is generally of fine crystalline sharply defined beddings of two (2) to three (3) meters thick. Regionally, this bed dips (inclined) uniformly due north, two to three (2 to 3) degrees; see profile A-A'.

The subsurface limestone is honeycombed with solution cavities and major cavern network thru which most of the internal drainage is channeld downward and into the upper aquifier which lies several feet above sea level.

Structurally the Aymamon limestone has been little affected by orogenic or seismic activities thus, it is little deformed. As to tension joints or fault scar, if any existed due to uplift or seismic movement, has long been obliterated due to the capacity of this limestone to readilly recement or seal itself in the same manner that it is readily susceptible to solution activity.

At the property to be developed all the stratigraphic and lithological features which characterize the Aymamon limestone may be appreciated from exposures of the horizon at a deep collapsed sinkhole which exists within the property boundaries and at nearby road cuts and cliffs.

Features of a well developed Kartz topography, typical of the Aymamon limestone, are concealed underneath the terrace sediments. Sporadically, sinkholes and similar solution depressions are exposed at the surface indicating that the collapse are probably post-quaternary in age or that interconnecting solution passages are, or were of considerable dimensions as to be able to fully funnel accumulated terrace sediments during quaternary time.

Infiltration and underground drainage of surface waters is so well developed that creeks or major streams are rather rare in the region although a well distributed annual rainfall of 59 inches falls in the region.

SUBSURFACE WATER RESOURCES

Regionally, the internal drainage is well developed. Major rivers and creeks are scarce and the few that exist, like Los Cedros Creek, surrenders a great deal of its channel flow to the permeable Aymamon limestone. A reservoir project on the northern extremes of the Los Cedros Creek resulted in a complete or total failure due to the intense percolation into the underlying limestone. With a precipitation of 65 to 70 inches a year, the region is considered sub-humid to semi-arid and an ample irrigation works has been established.

EVALUATION OF THE SINKHOLE AND CAVE AS A DRAINAGE OUTLET

The general geologic profile and location of the sinkhole at Digitals is shown in cross section A-A.

Two men penetrated the cave located at the bottom of the sinkhole with the purpose of determining its internal structural geologic features such as joints, faults or analogous structural weaknesses that could be present along the caves ceiling and walls. The detrimental aspects, from an engineering geologic point of view or potential hazards due to weak ceiling zones along the cave trend or zones of influence were also analyzed. Below is an account of the cave exploration and survey conducted.

The sinkhole is the natural drainage outlet for over 60 surrounding acres of pasture sandy clay loam terrain. It was invariably created as a result of a roof collapse of a major local cave system. The dimensions of the main sinkhole shaft are as follow:

Cylindrical in shape and thirteen (13) feet deep and seven (7) feet in diameter. At the base of the sinkholes a small chamber trending east northeast

and approximately fifteen (15) feet in depth and seven (7) feet from ceiling is the only accessible and opened chamber of what seems to be a continuous but deep seated solution network. An additional solution shaft dropping eight (8) feet vertically is located at the end of the fifteen (15) feet chamber. This latest shaft is partially clogged with soil and limestone debris and is the main drainage way for storm surface run-off of the surrounding property. There are thus indications that lower chambers or subsurface passages continues at lower horizons. Considering that the actual drainage of the surrounding acres has been served by the existing sinkhole for hundred of years, and due to the highly permeable and extensive geologic material occuppying the immediate subsurface horizon, it is concluded that the sinkhole will be able to assimilate the unretarded run-off and waste waters discharges that will be imposed by the new Digital's facilities.

Recommendations herein outlined should be observed to prevent demaging the internal drainage outlets with excessive sedimentation. No other natural or artificial discharge outlet is available near the proposed plant site that could be considered least damaging to the environment than the existing sinkhole. It is to be expected that the natural drainage waters and future imposition of storm and waste waters should pass through a natural filtration and purification layer of unconsolidated horizon before integrating itself to the water table interface near the coast.

It is expected that due to the northward trend of the major solution openings of the tertiary limestones belt in Puerto Rico, treated waste waters, discharged into the Digitals sinkhole shall undergo an additional degree of filtration before reaching its final point near sea level.

Both, the trend of the major solution cavities and the dip of the limestone strata, together with the clasic hydrostatic gradient of the limestone units of

northen Puerto Rico, allows for a northward travel and discharge of underground water in the region.

OTHER CONSIDERATIONS

It is not expected that underground solution chambers or caverns present potential structural problems to the proposed building facilities. The upper horizon of the Aymamon limestone unit outcropping in the region is rather marly and consequently a soil forming limestone rather than a prolific cave forming limestone. In addition a deep soil horizon overlies the limestone unit at the Digitals site. Thus, any cavernous continuity if it exists is deep seated and of no potential hazard to the proposed structure and facilities.

The small areas where subsidence have occurred during the geologic past within the propery in question are outlined in the accompanying geologic map. This depression are stabilized and no sign of recent subsidence movement was evidenced during the geologic inspection.

During and after the construction phase, conservation practices should be adopted to protect the sinkhole from potential damages. Plugging the sinkhole or partially obstructing its drainage arteries with sediment-ladden run-off water may result if no provisions are adopted during the earth movement activities. Such provisions may be attained by ponding the principal drainage gullies so as to attain sedimentation or decontamination of excessibe sediments before discharging into sinkhole.

The existing shaft is partly clogged with marly soil and limestone fragments derived from the collapsed roof and from the drainage basin. Thus, a great deal of soil and soil forming geologic material is found at the bottom of the sinkhole and in the drainage shaft. It should be expected that such sedimentation must

have been prolonged extensively by running water to the lower subsurface solution channels.

CONCLUSIONS AND RECOMMENDATIONS

The following enumerated items covers the most important highlights with respect to the hydrogeologic study conducted at the proposed Digital's plant site in Aguadilla.

I. With respect to the sinkhole:

1. A sinkhole located within the property to be developed consists of a caved-in ceiling in a limestone formation known as Aymamon. This depression is the natural drainage outlet for over 60 acres of flat to undulating terrain and can be favorably used to dicharge storm and treated waste from the proposed Digital's operation.

2. The Aymamon limestone is riddle with solution openings, channel networks and a favorable hydraulic gradient due to its slight inclination northward. Thus, the sinkhole can withstand imposition of a fast, unretarded run-off which will move rather fast to lower horizons and eventually to discharge point along the coast 1.5 miles away.

3. During construction phase, measures should be implemented to avoid sediment ladden waters from reaching the sinkhole and plugging the solution opening with sediments and thereby reducing infiltration rates of the same.

12. FIRE PROTECTION

Adequate and dependable water wupply is essential for fire safety. The 0.2 mgd to be used by the plant takes into consideration the water needs for fire protection. The line from the Aguadilla filtration plant will reach the plant with a pressure of about 60 psig and will carry about 1 mgd. There will be a fire sprinkler system in all the buildings and two 250,000 gal storage tank will provide water for fire pumps.

13. NOISE

13.1 During Construction

It is expected that there will be a considerable amount of construction activity on the site that will result in some noise contribution to the area during a period of about 15 months. The noise will result from the normal activity of earth movers, trucks and equipment associates with placement of concrete.

13.2 After Construction

The only equipment that will generate noise are two small compressors, each 50 hp. The Digital plant at San Germán is located accross a new urbanization. Noise complaints have never been received from the neighboring residents.

The only increase in noise level will result from the additional traffic from cars utilized by the plant employees and visitors. This will be limited to the scheduled hours of operation when the employees arive at the plant for work. The cars will be at the parking lot, generating no noise, for almost all the 8hr shifts.

It is Digital policy to comply with the industrial noise standards of the Walsh-Healy Act and OSHA. In fact, Digital will not purchase manufacturing equipment whose sound level exceeds 85 DdA for

a duration of eight hours per day.

The generation of noise in a plant of this type is minimal. Digital's plant in San Germán, which has similar operations is located across the street from a middle class residential neighborhood and no complaints of noise have ever been received.

14. TRAFFIC

Noise levels will be below the noise-exposure limits requiring operator protection or limited exposure times for the workers.

There will be an increase in traffic on PR Rds 459 and 467 leading to the plant in Aguadilla. This increase in traffic, about 300 cars per day, will result in additional noise and additional automobile emissions. This will be limited primarily to the "rush" hour before and after work and is unavoidable.

Traffic through three roads is very low, with an ADT of less than 1,000, according to studies made by the Highway Authority.

There are no public buses serving the area, thus most of the plant employees will go to work utilizing their own vehicles. Some of the employees will utilize a "pool" system, and in this way the number of vehicles will be reduced. However, no prediction can be made of the number of employees that will go to work in "pool" vehicles at this time.

Transportation within the plant premises will be practically nil.

15. CONSIDERATIONS AS TO SAFETY OF OPERATIONS AND PLANT EMPLOYEES

Considerations were given in the preparation of the design and operations to be conducted to the safety and health of plant employees. It was necessary to consider the plant environment, as a whole, as well as the surrounding environment with regard to health and safety of neighboring rural areas. In this respect plant location, plant layout, design, construc-

tion, maintenance and operations during and after construction of the facility were all planned with consideration of the Environment.

A detailed technical study was made for protecting the surrounding community. A buffer zone is required for the proctection of the plant from hazards.

The potential hazards as indicated in a technical publication [12] were indentified as follows:

Flamable materials

Heat

Ignition sources

Presence of oxygen

Presence of compressed gasses

Toxic materials

Possibility of human error

Possibility of mechanical failures

Movement of people and equipment

Reduced visibility

Movement of people and equipment is very rare in a plant of this type. None of the other identified hazards as defined by Liston are represented in the operations to be conducted by the Digital plant.

Other hazards taken into consideration for safety purposes are the following:

Fire

Explosion

Release of free toxics

Stumbling

Falling

Collision

16. AESTHETIC AND SOICAL CONSIDERATIONS

The Digital plant in Puerto Rico will be built with the same high standards that are used in the States in quality of building materials, architectural design standards, pleasing and coordinated color schemes, acoustical treatment, food service, landscaping, etc. The facilities that Digital has constructed in several parts of the world are testimonials to the high standards that will be used in Puerto Rico.

About 25 acres of the new plant site will be landscaped. Generous plots of grass combined with shrubbery, bushes and trees indigenous to Puerto Rico will be used to enhance and compliment the architectural design of the building and the natural beauty of the site. Special instructions were given to the architects to develop a design that will be in accord with the Puerto Rican landscape and natural beauty.

Digital is an equal opportunity employer. It is their practice to employ the best qualified applicant for each available job opening, regardless of such factors as race, color, religion, sex or ancestry, and to give the employee the best possible start on his new job. This is done with the hope and expectation that he will succeed as a responsible employee.

Digital is very happy with the work that has been performed by their Puerto Rican family at the San Germán plant. Their efficency in production is primarily Digital's decision to expand the San Germán facilities, and to construct the additional plant at Aguadilla.

Digital encourages individual initiative in training and development programs. Possible future and more responsible assignments are available in the company through on-the-job training programs, lectures, seminars

To prevent these other hazards, consideration was given to the selection and use of the best and most reliable equipment, providing adequate access roads and ways for the movement of personnel and equipment during construction.

The investment in the plant is considerable. The fire equipment, therefore, will be designed to minimize any hazard and to assure complete safety as per the standards required by the insurance companies. There will be fire hydrants, and a sprinkler system to reduce the possibility of damaging people, equipment and material by fire hazards. A safety engineer will review all the drawings before these are submitted to the Planning Board.

The guidelines of the National Fire Protection Association will be followed, as well as the Federal requirements for safety as defined by the Department of Labor; Occupational, Safety and Health Administration; and those from the Department of Labor of the Commonwealth of Puerto Rico.

This particular operation is not air conditioned, thus complete recirculation of air is provided. The OSHA Regulations will be closely followed in this respect.

An adequate ventilating system will be provided for the electroplating area complete with exhaust hoods, push air and scrubbers. The non-electroplating part of the plant shall be air conditioned.

and the employee educational assistance plan.

Digital considers itself a part of the Puerto Rican community, and encourages its personnel to take part in civic and cultural activities, and to share in the growth and development of the community at large. Digital intends to be, as has been in the past, a desirable corporate neighbor, a good and pleasing place to work, a contributor to the economy of Puerto Rico, and an enricher of the educational and cultural values and activities of Puerto Rico.

17. CONSIDERATION OF ALTERNATE LOCATIONS

Several locations were considered for the establishment of the new Digital facilities in Puerto Rico. These were as follows:

17.1 Ponce-Guayanilla Area

This was considered a good area, but there were problems to be solved as to water requirements and wastewater disposal. Water could have been obtained from the Toa Vaca project, but the development of this project by the Government is at this time in an early stage.

17.2 San Germán Area

Although this area was considered, it was concluded that it would be better to expand the operations at San Germán and construct a new plant in another site. All the operations generating wastewaters would be transferred to only one plant, leaving the second plant with production work that requires no water usage. In this way the impact on water pollution will be reduced, as the " wet " operations are conducted at only one plant, and consequently the discharge of process wastewaters would occur at only one place.

17.3 Mayaguez-Añasco Area

Consideration was given to locate the plant in the Añasco area, but again there were no available sites for the discharge of wastewaters, and the impact on water use would be higher. Water would have to be obtained from the pipeline being installed from the Miradero Plant at Mayaguez to serve Añasco. It was considered that the impact on this additional water by Digital would be detrimental to the domestic water users, both at Mayaguez and Añasco, and there would be no assurance of obtaining the necessary water demand at all times. Consideration was also given to the use of underground waters, but it has been the experience of an industrial plant at that site that the underground aquifer is not reliable. Furthermore, the water is high in minerals, especially calcium and magnesium. These constituents might affect the delicate operations to be conducted at the Digital plant.

17.4 Aguadilla Area

Aguadilla was considered the best location for the new plant. It has an airport nearby recently opened to public use. It is an area of high unemployment and personnel would be easier to obtain at the same time Digital will be helping to solve the economic problems in an area which badly needs additional sources of income for its residents.

With the help of Fomento, it was possible to solve the problem of water requirements and although there is no sewerage system in the area (in fact, there was no sewerage system in any of the sites considered, except for San Germán), there is a natural sink-hole which because of its location near the north-west corner of the island and the absence of reliable underground water sources, presents little or no possibility of

contamination by the discharge of wastewaters.

The land utilized by the plant has little, if any agricultural value, or at least if has never been utilized to grow agricultural products, although it is used by small farmers for raising cattle.

17.5 Barceloneta Industrial Park

It was felt that Barceloneta has already too many industries, and that the establishment of another industry, which will require about 500 jobs, would present some problems both to Digital and to the other industries located in that area.

18. ASSESMENT OF IMPACT

18.5 Environmental Protection Measures

It has been the practice of Digital to conduct environmental studies and to consider the possible adverse impact due to the design of its plants. It has also been their practice to operate and maintain their facilities in such a way that there will be minimal adverse impact to land, air, water, vegetation, noise, safety and other factors of human value. It is also Digital's practice to insure compliance with all the local and National laws and regulations relating to the protection of the environment.

One of the environmental protection measures being taken is the recycling of waste streams. The re-use of water rinses, reduces the disposal of liquid wastes that could endanger the environment, and reduces the esthetic impact of the proposed facility.

Constant evaluation will be made during the design, construction

and operation of the facility to cope with any new problem that may arise concerning possible deterioration of the environment.

(1) As to Land Use

During Construction

The Digital plant will use about 55 acres which were not being utilized. It is an area with natural scenery, almost untouched by construction or industrial projects.

This natural beauty will be changed slightly because of the construction works, and the land will no longer be available for the raising of cattle. It is considered more beneficial to Puerto Rico to use this land for the promotion of jobs rather than for any other purpose. The proposed land use would not considereably alter the flora or fauna of the region.

The natural landscape of the area will be altered with the establishment of the plant. This cannot be avoided. However, landscaping architects have been contracted to provide a pleasing architectural effect on the plant premises.

The movement of land and its use will not disturb any river nor will there be any adverse effect on the flora and fauna of the region.

(2) After Construction

The landscape of the area will be altered by the construction, changing from an unused lot of land with an agricultural image, to an industrial area, but every attempt will be made to have the landscaping blend in with the natural surroundings.

18.2 Impact on Water Resources

(1) Surface Waters

The movement of land generally affects surface waters in the

nearby areas, especially during periods of rainfall when it dissolves the exposed soil constituents and other minerals. In this case, however, this will not occur, as all the runoff will go through the sink-hole located on the plant premises. The closest body of water, Quebrada de los Cerdos, will not be affected either by the construction works or by the manufacturing operations to be conducted. The closest public water supply system is Aguadilla. Its source of water is the Isabela irrigation channels. There is no possibility of the runoff reaching these waters.

(2) Underground Waters

There is no known source of underground water in the vicinity and the discharged of the wastewaters through the sink-hole should have no effect on the evironment. In fact, there is an industry located in that area which is already discharging treated inorganic wastewaters through a small sink-hole with no apparent ill effect on or deterioration of the environment. No water will be used from underground sources, as the water will be supplied by the Aguadilla system operated by the Aqueduct and Sewer Authority. Thus, there is no impact on the underground use of water resulting from the Digital project.

(3) Coastal Water Pollution

There is no possibility of contaminating the coastal waters in the Aguadilla area. The wastewaters will be discharged to the sink-hole, as proposed, but only after treatment to the standards previously discussed. If the sink-hole discharges to the ocean, the possibility of contamination is practically nil, as the metallic ions will be removed to adequate and acceptable levels to comply with the regulations promulgated by EPA an EQB, and the domestic wastewater will receive treatment in an activated sludge package plant.

18.3 Impact During Construction

Construction of the proposed Digital plant at Aguadilla will affect the terrestrial environment by altering its surface characteristics. Excavations and grading of construction sites, paving of access road and parking lot, and other such activities will change the terrain and drainage patterns to a slight degree. Partial removal of vegetation may also cause minor changes in the surfate hydrology of the site.

Construction of permanent facilities will firmly commit the site to industrial use for the life of the facilities, thus closing potential options on other possible uses of the site. Since the site has been rezoned for industrial purposes, and already committed in principle, and since the land is presently unproductive, this should not be considered to be an adverse effect on the terrestrial environment.

By reducing the vegetation cover, construction will also reduce animal habitat. No more cattle will be present on this site.

The relative isolation of this underdeveloped site insures that construction of the proposed facilities will not interfere with other man-made facilities such as roads, highway, power lines, etc. Neither will they interfere with any sites of natural, historic or scenic value.

The noise and other minor environmental disturbances which constitute temporary consequences of construction will be minimized by careful planning and good practices. The esthetic impact of the finished facility will be minimized by saving, as much as possible of the native vegetation, and by careful landscaping and cleanup operations during the final phases of construction.

There will be some air contamination during the construction phase, which will come from the movement of land, resulting in dust, and from the use of materials of construction. This cannot be avoided, but will be minimized by using contractors of known expertise and utilizing the best and safest methods of construction.

18.4 Other Considerations

Continuing environmental studies and the design of special facilities to reduce the metallic ions going into the process wastes are all intended to minimize the environmental impact of the proposed project with respect to land, water, vegetation, safety, man-made facilities and other factors of human value or concern and to insure compliance with all applicable regulations and environmental standards. Recycling of waste streams in the plant and the combining of various waste streams will be practiced. Disposal of solid wastes will be done in a way that would not cause environmental contamination. Landscaping will be practiced to reduce the esthetic impact of the proposed facility. As these studies will be continued during the design, construction and early operational stages, comparable environmental protection measures will be considered for any new problems that may come to light.

(1) Effect on the Atmosphere

No effect in the atmosphere is expected from the construction and operation of the proposed plant.

(2) Effect on the Aquatic Environment

No effect in the aquatic environment or fish life is expected from the proposed plant.

18.5 Economic and Social Impact

The construction and operation of the Digital plant will have certain distinguishable economic and social effect upon the Aguadilla area. Not only will the construction of the plant reuslt in substantial economical benefits to the area through increased employment and trade, but its operation will also affect most of the northwest sector by suppying new job opportunities Municipalities such as Aguadilla, Aguada, Moca, San Sebastían, Isabela, Mayaguez and others will benefit from the operations to be conducted by Digital. Identification of the economic benefits which are both directly and indirectly attributable to the proposed plant will help establish the desirability of such a plant at the proposed site. Likewise, construction and operation of the Digital plant will produce certain social changes for the local and regional populations. While such social effects cannot be so readily quantified, these nevertheless can be viewed qualitatively.

Table IV shows the estimated primary and secondary employment impact resulting from the construction and operation of the proposed industrial plant.

TABLE V

ESTIMATED PRIMARY AND SECONDARY EMPLOYMENT IMPACT
RESULTING FROM CONSTRUCTION AND OPERATION OF THE
PROPOSED DIGITAL DE PUERTO RICO PLANT AT AGUADILLA

Category	Reference	Total Construction Effects (In million Dollars)	Average Annual Operation and Maintenance Effects (In million Dollars)
Approx. No. of Employees		(125)	(600)
Approx. Payroll (Annual)		2	3
Secondary Effects			
Gross Product	(13)	3.7	5.55
Personal Income	(14)	2.84	4.26
Retail Sales	(15)	1.40	2.10
Service Trade Receipts	(13)	0.32	0.48
Bank Demand Deposits	(13)	1.04	1.56
Local Taxes	(16)	0.243	0.364

19. ADVERSE E[illegible]IRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

19.1 Dur[illegible] Construction

All [illegible]ne potentially adverse environmental effects associated with the propo[illegible]ed project will be minimized. Short term disturbances such as noise [illegible]ssociated with construction activities may be considered temporary with no permanent adverse environmental effect.

The additional disturbance of the landscape and of various facilities wil[illegible] occur to a moderate degree and for a relatively short period of time. The total area affected will be approximately 55 acres .

Par[illegible]ial removal of vegetation as well as slight alterations of terrain are una[illegible]voilable and to some extend are the adverse environmetal effects that ac[illegible]company almost any type of construction. The post-construction impact of these landscape alterations can be minimized by routine adherence to a[illegible]ppropriate regulations, routine clean-up operations, and careful landsca[illegible]ping.

The adverse effect on water will be the necessity of using up to 0.2 mdg, which could be used for other purposes.

20. SHORT TER[illegible] USES OF ENVIRONMENT AND THE MAINTENANCE OF LONG TERM PRODUCTIV[illegible]TY

The long [illegible]erm productivity of the proposed project cannot be stated in definitive [illegible]erms. However,there are several gross generalizations that can be made co[illegible]cerning the longer-term effect.

The const[illegible]uction of these facilities will result in Puerto Rico gaining technol[illegible]ogy in a new technical field supporting the world's leader in minicompute[illegible] sales. The creation of new jobs for year [illegible]o come will raise the standard of[illegible] living of the inhabitants of the area. With respect to the

productivity of the specific physical sites, construction of the Digital plant is expected to produce minimal negative impact. The land site at the proposed sector,is presently unproductive in terms of agricultural, mineral, wildlife, flora, fauna, etc., with the possible exception of a few head of livestock. Soil in this area is classed as very poor to fair for potential agricultural use. There will be no changes in air quality as a result of the establishment of the plant.

The risks to long-term biological productivity is minimal.

21. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

21.1 Economic and Human Resources

A total capital investment of about $4.6 million would be committed for construction of the proposed facility, while the annual payroll for operating personnel would be about $3 million.

The labor commitment for the proposed project would be about 125 man-years for construction of facilities and about 600 man-years for the operating personnel.

21.2 Material Resources

The principal commitment of material resources would be the power required for the generation of the electricity used and the use of fuel oil for its generation. Additionally, up to 0.2 mgd of water will be used for this operation from the region' s water resources. This water when discharged through the sink-hole, as proposed, will be lost permanently.

Modest amounts of construction materials including concrete, sand, gravel, steel, copper, etc. would be used to construct the proposed plant.

Some sophisticated instruments and controls will be required, and the use of man to manufacture the different computers will represent requirements for skilled labor and special facilities for their construction and installation. This also represents a commitment of resources.

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Planes masivos para Ramey

Por WILDA RODRIGUEZ
De El Nuevo Día

UN DESARROLLO industrial masivo y el traslado de la Guardia Nacional Aérea a la Base Ramey constituyen el futuro de Aguadilla.

Los planes del Gobierno para la desmilitarización de la economía de Aguadilla no se hicieron esperar ayer como reacción al anuncio federal del cierre de operaciones militares en la Base Ramey para los últimos seis meses de este año.

El Gobernador citó a una conferencia de prensa temprano en la mañana para revelar que su Gobierno está tomando "medidas inmediatas" para aliviar el impacto del cierre de la Base en Aguadilla, comenzando con la instalación de una fábrica que proveerá 600 empleos de inmediato. Ramey hasta ahora, constituía la generadora de empleos más importante de Aguadilla.

Por otro lado, el Gobernador reveló que está reconsiderando el trasladar a Ramey la Guardia Nacional Aérea de Puerto Rico, pese a que meses atrás dijo a la Prensa que había decidido en contra de ese traslado.

Quiso aclarar ayer que su decisión sobre la **mudanza no guardará relación "ni en la forma más remota"** con la disposición de la Fuerza Aérea de cerrar operaciones en Ramey.

Todo lo que pretende es mantener abierto el aeropuerto de la Base una vez l[illegible]erza Aérea lo abandone.

Se sabe que el Gobernador recibió una recomendación en contra del traslado por parte del Ayudante General de la GN, general Fernando Chardón. Chardón visitó hace algún tiempo La Fortaleza para informarle al Ejecutivo su oposición en base a que muchos de los mecánicos de mantenimiento de la GNA habían anunciado su intención de renunciar a la fuerza de efectuarse el traslado.

FUE ENTONCES que, a preguntas de la Prensa, el Gobernador indicó que no trasladaría a la GNA. Sin embargo, ayer anunció que reconsideraría el asunto.

Por otra parte, el cierre de la Base Ramey provocó la movilización de la fase industrial del Gobierno para dirigir esfuerzos hacia un desarrollo acelerado del área.

De inmediato se anunció el establecimiento de una planta de la Compañía de equipo digital con 600 empleos inmediatos y 2,000 potenciales.

Se anunciaron medidas para facilitar la relocalización de otros empleados civiles afectados; la unión de funcionarios del Departamento de la Defensa Federal, el Gobierno Estatal y el Gobierno Municipal para el desarrollo civil de Aguadilla; y un acuerdo de compra de 186 cuerdas cercanas a Ramey por parte de la Compañía de Desarrollo Industrial.

Allí se instalará la planta digital y se anticipa el establecimiento de otras dos plantas farmacéuticas.

Por otra parte el comandante de la Base Ramey, Kenneth B. Clark, dijo que el retiro de la Fuerza Aérea de Ramey se puede considerar una apertura en lugar de un cierre.

Dijo Clark que con la ayuda de los líderes locales Ramey se puede convertir en un centro activo de producción y una adición a los recursos de Puerto Rico. En una carta enviada a la alcaldesa de Aguadilla, Clark dijo que el énfasis debe ser en nuevos empleos y la repoblación de la ciudad desocupada de Ramey que fue sede de una activa instalación defensiva.

Clark dijo que la base no cerrará en su totalidad, ni se abandonará como lo ha informado la Prensa. Indicó que la retirada se planeará ordenadamente.

Governor Acts To Offset Effect Of Ramey Closing On Aguadilla

By BETSY LOPEZ ABRAMS
Of The STAR Staff

Gov. Hernandez Colon Tuesday set wheels in motion to intensify the industrialization of Aguadilla, following the Pentagon's announced shutdown of Ramey Air Force Base by the end of this year.

He announced establishment of a factory, creation of a municipal-executive committee to plan for the area's development and hinted, for the first time in his administration, that

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Ramey may be developed into Puerto Rico's second international airport.

At the same time the Governor said he is "considering" the transfer of the Air National Guard to Ramey.

Actually the Governor will be "reconsidering" the move because several weeks ago he told newsmen that he had decided against moving the guard to Aguadilla.

Although he went through pains to note that the U.S. Air Force decision to close

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AGUADILLA INDUSTRIALIZATION PLAN

(Continued From Page 3)

federal education money for Puerto Rico. By fiscal 1976, Puerto Rico would be eligible for $84 million.

Once reaching the state the base "is not even remotely related to the decision the Governor may take" on the move, the fact remains that the Governor had already announced his decision against the move.

The transfer was not favorably recomended by the adjutant general, Gen. Fernando Chardon, who was faced with numerous resignations when word of the possible move got around.

The possibility of moving the guard to Ramey, Hernandez Colon said Tuesday, is being considered "to keep the airport open once the Air Force terminates its operations."

The Governor was optimistic in the face of the shutdown. Closing of the base, he said, "offers great possibilities for the development of Aguadilla and the northeast region of Puerto Rico."

He said a digital company factory providing 600 immediate jobs, with a potential for an eventual 2,000, is being established. This factory is expected to be operating by the begining of next year. The plant produces computers and related components.

Establishment of two pharmaceutical plants is also under consideration. Esteban Davila Diaz, president of the Industrial Development Co., said the company has purchased 186 acres near the base for industrial development.

The Governor said that other measures will be taken to facilitate relocation of affected civilian employes.

In addition, Hernandez Colon said, the Defense Department "has made available to us a team of officials" who will advice on the civilian development of the base's facilities.

The Governor said he has designated Rafael Ignacio, a Planning Board engineer, to represent the executive branch and plan for the area's development in coordination with a civic committee that will be designated by the mayoress of Aguadilla, Conchita Igartua de Suarez.

The committee, the Governor said, will begin operations immediately and will develop facilities such as the airport, "which we expect will be international," educational facilities, housing facilities, recreation, tourism and industry.

Evitaría Pérdida Empleos

El gobernador Rafael Hernandez Colón revelo en la mañana de hoy martes estar considerando el traslado de la Guardia Nacional Aérea a la Base Ramey en Aguadilla, como alternativa al cierre de esta última anunciado para junio de este año.

En conferencia de Prensa celebrada esta mañana, Hernández Colón aseguró que la acción de trasladar a Ramey la Guardia Nacional Aérea surge como propósito de mantener en funciones aquellas facilidades evitando la cesantía de los empleados civiles que laboran allí.

En adición el gobernador Hernández Colón afirmó que se establecerá una fabrica de la compañía "Digital" en Aguadilla, para "aliviar el impacto que causara el cierre de la Base en el area de Aguadilla".

Hernández Colón dijo que la fabrica empleara inicialmente a 600 personas y tiene un potencial de 2,000 empleos.

Los detalles sobre la fábrica serían anunciados más tarde por la Administración de Fomento Económico, según Hernández Colón.

El Gobernador anunció además que ha encomendado al ingeniero Rafael Ignacio encabezar un comité de ciudadanos para que "lleve a cabo los trabajos para proyectar el desarrollo del area".

El anuncio fue hecho por el Primer Ejecutivo tras una reunión con la alcaldesa de Aguadilla, Conchita Igartúa de Suárez, y el presidente de la Junta de Planificación, Rafael Alonso.

La información sobre el hecho de que la Fuerza Aérea cerrara este año la Base Ramey y la entregara al Gobierno de Puerto Rico fue dada a conocer ayer lunes en Washington por el comisionado residente Jaime Benítez.

Una información de United

(Continúa en la Pág. 6-B)

en sus 8 páginas principales de su edición de marzo el que el barco furgón "le hace solamente segundo a Operación Manos a la Obra en hacer posible el desarrollo socio-económico de Puerto Rico".

El artículo que alaba el programa del desarrollo económico del Estado Libre Asociado de Puerto Rico, fue escrito por John T. McCullough, editor y publicista del periódico Chilton de Philadelphia, después de una visita a la Isla.

Comentando sobre la contribución de los transportadores marítimos al desarrollo de Puerto Rico, McCullough escribe:

"Cada vez que un furgón llega a San Juan, 'bombea' $900 a la economía puertorriqueña, así que no es difícil ver cómo el desarrollo del servicio de furgones ha espoleado el crecimiento de la Isla".

"Y el costo de este servicio se considera como una de las grandes gangas de la transportación en el mundo para el embarcador y el consignatario, con un promedio de menos de $600 por cada caja de 40 pies. El único problema es que los transportadores marítimos, mientras hacen negocio están operando bajo [illegible] en el tráfico y los embarcadores derivaron beneficios de un servicio alternado y competitivo. Y en el 1968, la Transamerican Trailer Transport ofreció a los embarcadores la alternativa de una rápida operación de barcos-furgones 'roll-on' y 'roll-off'", dice el Editor.

Sobre el crecimiento económico de Puerto Rico, Mccullough expone:

"Pocos de los que vienen de vacaciones se dan cuenta de que detrás del brillo del sol, está un gigante industrial cuyo fenomenal crecimiento económico está tercero en rango, detrás, solamente, de Japón y de Israel. . con un producto bruto aumentando de $700 millones en el 1948 a un récord de $5.8 billones en el 1972. . "

Apuntando brevemente que además de sobre 2,000 afiliados americanos ahora en operación, hay como 25 compañías extranjeras operando 39 plantas diferentes en Puerto Rico. McCullough cita a un oficial de la Sea-Land:

"Ha sido por años nuestro debate el que Puerto Rico tiene muchas ventajas naturales de ser, no solo el centro del tráfico del Caribe, sino probablemente del tráfico de [illegible] Europa y el Lejano Oriente a todas esas áreas cubriendo a Puerto Rico y desde esas áreas que cubren a Puerto Rico de regreso a Europa y al Lejano Oriente. Todavía este tráfico no es muy grande, pero hay un patrón definitivo de crecimiento".

Se cita a Neuhauser en la historia de haber dicho que el valor de este concepto es "que desde Puerto Rico estamos proporcionando ahora un eslabón directo con 40 países alrededor del mundo, significando que los socios de Puerto Rico en los mercados de comercio, están en esta forma establecidos por un sistema viable de transportación.

Comentando sobre el problema de los cargos por estadía de los transportadores marítimos y que ahora se estiman en $3 millones lo que deben los consignatarios en Puerto Rico, dijo Hiram D. Cabassa, presidente de la Asociación de Servicio Marítimo de Puerto Rico en una cita en dicho artículo:

"Con todos los transportadores envueltos en un tráfico desbalanceado ,el que los consignatarios retengan los furgones significa que el transportador no puede llevar los furgones vacíos de regreso al Norte y así proveer un flujo ordenado de equipo".

"De este modo, los gastos de los transportadores aumentan, y últimamente, todos los embarcadores terminarán siendo penalizados por el egoísmo de algunos", dijo Cabassa.