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U S EPA RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMIT FOR HAZARDOUS WASTE TREATMENT PERMIT MS2 170 022 626 WITH TRANSMITTAL LETTER NCBC GULFPORT MS

7/2/1986

U S EPA REGION IV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

July 2, 1986

4WD-RM

Captain C.M. Maskell
CEC, U.S. Navy
Commanding Officer
Naval Construction Battalion Center (NCBC)
Gulfport, Mississippi 39501

Re: Research Development and Demonstration (RD&D) Permit Naval Construction Battalion Center, Gulfport, Mississippi
MS2 170 022 626

Dear Captain Maskell:

The purpose of this letter is to notify you that a final permit determination has been made, and to transmit the permit document and applicable regulations.

In accordance with 40 CFR Part 124.15, EPA has made a decision to issue the draft permit. The permit is effective on August 4, 1986. The public comment period ended on June 30, 1986.

Public comments on the draft permit have been received and EPA has considered these comments in the final determination. Part I, Condition I.8.d. was added following the evaluation of a public comment. This condition requires that the permittee submit the sampling protocol for treated soil residues to EPA for approval. Operational changes requested by the applicant during the public notice period have also been made to the final permit.

Procedures for appealing this decision and requesting review of any condition of the permit decision may be found in 40 CRF Part 124.19.

Sincerely yours,

Patrick M Tobin

Patrick M. Tobin, Director
Waste Management Division

Enclosure

cc: Jack M. McMillan, Mississippi Department of Natural Resources
Captain Terry Stoddart, USAF BSC

ENCL ( )

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Waste Management Division

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH, DEVELOPMENT AND DEMONSTRATION PERMIT
FOR HAZARDOUS WASTE TREATMENT

Permittees: U.S. Navy
U.S. Air Force
Facility: Naval Construction Battalion Center

Permit Number: MS2 170 022 626

This permit is issued by the United States Environmental Protection Agency (EPA) under authority of the Resource Conservation and Recovery Act Subtitle C, 42 U.S.C. §§6921-6931 (1976, Supp. IV 1980 and Hazardous and Solid Waste Amendments of 1984) (RCRA) and EPA regulations to the United States Air Force and the United States Navy (hereafter called the Permittees), to operate a hazardous waste research, development and demonstration facility located in Gulfport, Mississippi at the Naval Construction Battalion Center (NCBC) at latitude 30° 18' and longitude 89° 12'. The project will test incineration and chemical treatment as a waste treatment process to decontaminate soils that are contaminated with dioxin from Herbicide Orange.

The Permittees must comply with all terms and conditions of this permit. This permit consists of the conditions contained herein (including those in the attachments) and the Regulations specifically contained in this permit.

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter dated January 29, 1986, as modified by subsequent amendments dated April 2, 1986, and May 9, 1986 (hereafter referred to as the application) is accurate and that the facility will be constructed and operated as specified in the application. Any inaccuracies found in this information may be grounds for the termination or modification of this permit (see 40 C.F.R. §270.41, §270.43 and §270.42) and potential enforcement action (42 U.S.C. §6925(g)). The Permittees must inform EPA of any deviation from or changes in the information in the application which would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

This permit is effective as of August 4, 1986, and shall remain in effect until August 4, 1987, and shall not exceed 150 operating days after commencement of experimental treatment. This permit may be revoked and reissued, or terminated in accordance with 40 C.F.R. §270.41, §270.43 or §270.65.

7-2-86
Date

Patrick M Tobin
Signature
Patrick M. Tobin, Director
Waste Management Division

Table of Contents

PART I - STANDARD CONDITIONS

A. EFFECT OF PERMIT

This permit authorizes only the research on hazardous waste treatment expressly described in this permit and does not authorize any other management of hazardous waste. EPA will consider compliance with the terms of this permit to be compliance with requirements of RCRA Subtitle C and EPA regulations concerning the management of hazardous waste listed or described in this permit. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Section 3013 or Section 7003 or RCRA, Section 106(a), 104, or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601 et seq., commonly known as CERCLA), or any other law providing for protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 C.F.R. §270.41, §270.42, §270.43, §270.65 and 42 U.S.C. Section 6925(g). The filing of a request for a permit modification, revocation and reissuance, or termination or the notification of planned changes or anticipated noncompliance on the part of the Permittees does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The Regional Administrator may order an immediate termination of all operations under this permit at any time he determines that termination is necessary to protect human health and the environment (42 U.S.C. §6925(g)).

E. DEFINITIONS

For the purpose of this permit, terms used herein shall have the same meaning as those in Title 40 of the Code of Federal Regulations (40 C.F.R. Parts 260 through 264 and 270), unless this permit specifically states otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term. "Regional Administrator" is the Regional Administrator of the United States Environmental Protection Agency for Region IV.

F. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE REGIONAL ADMINISTRATOR

All reports, notifications or other submissions which are required by this permit to be sent or given to the Regional Administrator should be sent certified mail or given to:

U.S. Environmental Protection Agency
Director, Waste Management Division
345 Courtland Street, N.E.
Atlanta, GA 30365
(404)347-3454

G. SIGNATORY REQUIREMENTS

All reports or other information requested by the Regional Administrator shall be signed and certified as required by 40 C.F.R. §270.11.

H. DOCUMENTS TO BE MAINTAINED AT THE FACILITY SITE

The Permittees shall maintain at the facility, until closure is completed and certified by an independent registered professional engineer, the following documents and amendments, revisions and modifications to these documents:

1. Research plan as specified in this permit Attachment I.

2. Personnel training documents and records required by applicable portions of 40 C.F.R. §264.16 and this permit.

3. Emergency response plan required by this permit.

4. Closure plan required by applicable portions of 40 C.F.R. §264.112 and this permit.

5. Operating record required by applicable portions of 40 C.F.R. §264.73 and this permit.

6. Inspection schedules and logs required by applicable portions of 40 CFR §264.73 and this permit.

I. DUTIES AND REQUIREMENTS

1. Duty to Comply. The Permittees shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any other permit noncompliance constitutes a violation of RCRA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

2. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for the Permittees in an enforcement action to argue that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. CFR §264.15 and this permit.

3. Duty to Mitigate. In the event of noncompliance with this permit, the Permittees shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

4. Proper Operation and Maintenance. The Permittees shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittees to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facility or similar systems to maintain compliance with the conditions of the permit.

5. Property Rights. The permit does not convey any property rights of any sort, or any exclusive privilege.

6. Duty to Provide Information. The Permittees shall furnish to the Regional Administrator, within a reasonable time, any relevant information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittees shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

7. Inspection and Entry. The Permittees shall allow the Regional Administrator, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

   a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor, at reasonable times for the purposes of assuring permit compliance or as otherwise authorized by RCRA, any substances or parameters at any location.

8. Monitoring and Records.

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity in accordance with Attachment I.

b. The Permittees shall retain the final project report and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measure ment, report, or application. These periods may be extended by request of the Regional Administrator at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.

c. Records of monitoring information shall specify:

(1) The dates, exact place, and times of sampling or measurements;

(2) The individuals who performed the sampling or measurements;

(3) The dates analyses were performed;

(4) The individuals who performed the analyses;

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

d. The sampling protocol for the treated soil residues must be submitted to EPA for review and approval prior to sampling.

9. Reporting Planned Changes. The Permittees shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. This notice must include a description of all incidents of noncompliance reasonably expected to result from the proposed changes.

10. Certification of Construction or Modification. The Permittees may not commence incineration or chemical treatment of hazardous waste at the facility until:

a. The Regional Administrator has inspected the modified or newly constructed facility and finds it is in compliance with the conditions of the permit; or

b. The Regional Administrator has either waived the inspection or has not within 72 hours notified the Permittees of his intent to inspect.

11. Anticipated Noncompliance. The Permittees shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

12. Twenty-Four Hour Reporting. The Permittees shall report to the Regional Administrator any noncompliance which may endanger health or the environment. Information shall be provided orally within twenty-four (24) hours from the time the Permittees become aware of the circumstances. This report shall include the following:

    a. Information concerning release of any hazardous waste that may cause an endangerment to public drinking water supplies.

    b. Any information of a release or discharge of hazardous waste, or of a fire or explosion from the hazardous waste research, development, and demonstration facility, which could threaten the environment or human health outside the facility. The description of the occurrence and its cause shall include:

        (1) Name, address, and telephone number of the owner or operator;

        (2) Name, address, and telephone number of the facility;

        (3) Date, time, and type of incident;

        (4) Name and quantity of material(s) involved;

        (5) The extent of injuries, if any;

        (6) An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and

        (7) Estimated quantity and disposition of recovered material that resulted from the incident.

    A written submission shall also be provided to the Regional Administrator within five (5) days of the time the Permittees become aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance (including exact dates and times); if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Permittees need not comply with the five (5) day written notice requirement if the Regional Administrator waives that requirement and the Permittees submit a written report within fifteen (15) days of the time the Permittees become aware of the circumstances.

13. Other Noncompliance. The Permittees shall report all other instances of noncompliance not otherwise required to be reported above, at the time monitoring reports are submitted. The reports shall contain the information listed in permit condition I.12.

14. Other Information. Whenever the Permittees become aware that they have failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, the Permittees shall promptly submit such facts or information to the Regional Administrator.

15. Transfer of Permit. This permit may not be transferred to a new owner or operator.

J. COMPLIANCE SCHEDULE

The following information shall be submitted to the Regional Administrator before incineration of hazardous waste.

1. The Spill Prevention Control and Countermeasures Plan (SPCC) for the facility. The SPCC shall address but not be limited to the following:

   a. Spill prevention from hazardous waste staging and processing, solid residuals staging, and scrubber effluent staging.

   b. Spill containment from waste staging and processing units, effluent staging units, the MWP-2000 unit.

   c. Spill clean-up and rainwater disposition.

   d. Recordkeeping and Reporting.

2. The Statement of Work for Sampling and Analysis.

3. The Standard Operation Procedures specified on page 5-2 of Attachment I.

4. Telephone numbers and names of the emergency coordinators as described in Attachment IV.

PART II - GENERAL FACILITY CONDITIONS

A. DESIGN AND OPERATION OF FACILITY

The Permittees shall maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

B. RESEARCH PLAN

The Permittees shall follow the procedures described in the attached research plan, Attachment I.

C. GENERAL INSPECTION REQUIREMENTS

The Permittees shall follow the inspection plan set out in the inspection schedule, Attachment II. The Permittees shall remedy any deterioration or malfunction discovered by an inspection as required by 40 C.F.R. §264.15(c). Records of inspections shall be kept as required by permit condition G.I.c.

D. PERSONNEL QUALIFICATIONS

The Permittees shall ensure that personnel are qualified to manage hazardous waste as provided in Attachment III. This training program shall follow the attached outline, Attachment III. All personnel involved with activities under this permit shall receive this training prior to initiation of activities under this permit as described in the attached outline, Attachment III.

E. PREPAREDNESS AND PREVENTION

1. Required Equipment. At a minimum, the Permittees shall equip the facility with the equipment set forth in the emergency response plan, Attachment IV.

2. Testing and Maintenance of Equipment. The Permittees shall test and maintain the equipment specified in the previous permit condition and in Attachment IV as necessary to assure its proper operation in time of emergency.

3. Arrangements With Local Authorities. The Permittees shall maintain arrangements with State and local authorities as required by 40 C.F.R. §264.37. If State or local officials refuse to enter into or renew existing preparedness and prevention arrangements with the Permittees, the Permittees must document this refusal in the operating record.

F. EMERGENCY RESPONSE PLAN

1. Implementation of Plan. The Permittees shall immediately carry out the provisions of the emergency response plan, Attachment IV, and follow the applicable emergency procedures described by 40 C.F.R. §264.56 whenever there is an imminent or actual fire, explosion, or release of hazardous waste or constituents which threatens or could threaten human health or the environment.

2. Copies of Plan. The Permittees shall comply with the requirements of 40 C.F.R. §264.53.

3. Amendments to Plan. The Permittees shall review and immediately amend, if necessary, the emergency response plan, as required by 40 C.F.R. §264.54.

4. Emergency Coordinator. The Permittees shall comply with the requirements of 40 C.F.R. §264.55.

G. RECORDKEEPING AND REPORTING

1. The Permittees shall maintain a written operating record at the facility in accordance with 40 C.F.R. §264.73(a). The operating record must be maintained until closure of the facility and shall include the following:

   a. The location of each hazardous waste within the facility and the quantity at each location.

   b. Records and results of waste analyses performed as specified in Attachment I and the statement of work to be submitted under permit condition I.J.2.

   c. Records and results of inspections required by permit condition II.C.

   d. Monitoring, testing, or analytical data as specified in Attachment V.

   e. The documentation required under permit condition II.E.3 if applicable.

H. CLOSURE

1. Performance Standard. The Permittees shall close the facility in accordance with the closure plan, Attachment VI. In addition, the incinerator shall be operated on natural gas at the operating conditions specified in permit condition III.E. for two (2) days (48 hours) during closure to ensure contaminated soil is not left in the system.

2. Amendment to Closure Plan. The Permittees shall amend the closure plan in accordance with 40 C.F.R. §264.112(b) whenever necessary.

3. Notification of Closure. The Permittees shall notify the Regional Administrator at least 15 days prior to the date he expects to begin closure.

4. Time Allowed for Closure. After treating the final volume of hazardous waste, the Permittees shall treat or remove from site all hazardous waste and shall complete closure activities within 180 days of notification of closure in accordance with the closure plan, Attachment VI.

5. Disposal or Decontamination of Equipment. The Permittees shall decontaminate and/or dispose of all facility equipment as required by 40 C.F.R. §264.114 and the closure plan, Attachment VI.

6. Certification of Closure. The Permittees shall certify that the facility has been closed in accordance with the specifications in the closure plan, Attachment VI, as required by 40 C.F.R. §264.115.

I. EXPERIMENTAL PROCEDURES

The Permittees shall follow the experimental procedures set forth in Attachment I.

The Permittees shall handle all scrubber waters from the incinerator as described in Attachment VII.

The Permittees shall handle all treated solid residues from the incinerator as specified in Attachment VIII.

PART III - INCINERATION TREATMENT

III.A. CONSTRUCTION

The Permittees shall construct and maintain the incinerator in accordance with the attached plans and specifications, Attachment I.

III.B. PERFORMANCE STANDARD

The Permittees shall construct and maintain the incinerator so that, when operated in accordance with the operating requirements specified in this permit, it will meet the following performance standards.

1. The incinerator must achieve a destruction removal efficiency (DRE) of 99.9999% for 2,3,7,8 tetrachlorodibenzo-p-dioxin (TCDD) and dibenzofuran.

2. The Permittees must control hydrogen chloride (HCl) emissions, such that the rate of emissions is no greater than the larger of either 1.8 kg/hr or 1% of the HCl in the stack gas prior to entering any pollution control equipment.

3. The incinerator must not emit particulate matter in excess of 180 milligrams per dry standard cubic meter when corrected for the amount of oxygen in the stack gas in accordance with the formula specified in 40 CFR §264.343(c).

4. Compliance with the operating conditions specified in this permit will be regarded as compliance with the above performance standards. However, evidence that compliance with such permit conditions is insufficient to ensure compliance with the above performance standards may be "information" justifying modification, revocation or reissuance of the permit pursuant to 40 CFR §270.41.

III.C. MAXIMUM WASTE TO BE TREATED

The Permittees may treat up to 11,000 cubic yards of material identified in permit condition III.D.

III.D. LIMITATION ON WASTES

The Permittees shall treat with incineration the following hazardous wastes:

Waste Code Number	Description	Feed Rate
F027	Soil contaminated with Herbicide Orange	0-5 tons/hr
	Miscellaneous combustible (wooden pallets) and noncombustible (concrete/drums) refuse present on the storage area. Residues and equipment resulting from chemical treatment described in Attachment I.	

III.E. OPERATING CONDITIONS

The Permittees shall feed the waste described in Condition III.D. to the incinerator only under the following conditions:

1. The rotary kiln temperature, as measured by the outlet gas thermocouple, shall be maintained at 1200-1800°F.

2. The secondary combustion chamber temperature, as measured by the outlet gas thermocouple, shall be maintained at 2150°F.

3. Residence time, as calculated from mass flows and gas temperature, shall be maintained in a range between one (1) and two (2) seconds.

4. Stack gas carbon monoxide concentration, as measured by the extractive continuous emission monitor described in Attachment I.

5. Recirculation flow rate to the packed tower shall be maintained to meet scrubber efficiency requirements.

6. Recirculation flow rate to scrubber shall be maintained to meet scrubber efficiency requirements.

7. During start-up and shut-down of the incinerator, hazardous waste must not be introduced into the incinerator unless the incinerator is operating within the conditions specified in Condition III.E.

8. The Permittees shall control fugitive emissions from the combustion zone of the incinerator by operating the unit under negative pressure.

9. The Permittees shall operate the incinerator to immediately cut off the hazardous waste feed when any of the following conditions occur:

   a. Combustion efficiency, as measured by 100 x $O_2/(CO_2 + CO)$, falls below 99, where CO and CO_2, respectively, are the carbon monoxide and carbon dioxide concentrations in the stack gases.

   b. Oxygen concentration in the stack gases falls below 3%.

   c. Secondary combustor outlet gas temperature falls below 2100°F.

   d. Residence time falls below 1 second.

10. The Permittees shall monitor the facility as specified in Attachment I.

PART IV - CHEMICAL TREATMENT

A. CONSTRUCTION AND MAINTENANCE

The Permittees shall construct and maintain the chemical treatment units in accordance with the attached design plans and specifications, Attachment I.

B. MAXIMUM WASTE TO BE TREATED

The Permittees shall not chemically treat more than 12 cubic yards of soil which has been contaminated with dioxin from Herbicide Orange from NCBC, Gulfport, Mississippi during the term of this permit.

C. OPERATING CONDITIONS

1. The Permittees shall conduct the chemical treatment in accordance with the test procedures outlined in Attachment I.

2. Test 1. Slurry Process shall take place in Zone 1 and/or Zone 2 of the regulated area described in Attachment I.

D. CLOSURE AND WASTE DISPOSAL

The Permittees shall dispose of all residues and equipment resulting from chemical treatment in the incinerator. During disposal, the incinerator shall be operated as specified in permit condition III.E.

PART V - TEST DATA SUBMISSION

The Permittees shall submit a copy of all preliminary data collected during the tests to the Regional Administrator upon completion of the tests. The Permittees shall submit the draft and final reports for the incinerator and chemical treatment research projects as soon as such reports become available, but not later than one (1) year from the expiration date of this permit. If the reports are not completed at this time, the Permittees shall report monthly thereafter on the status of the reports. All submissions must be certified in accordance with 40 CFR §270.11. The Permittees shall make the raw data available to EPA upon written request.

ATTACHMENT I

PERSONNEL:

Contractor: Tests will be conducted by an EPA contractor, Galson Research Corporation. The principal investigator is Mr Robert Peterson, and their address is:

Galson Research Corporation
6601 Kirkville Road
E. Syracuse, New York 13057

(315) 432-0506

Mr Peterson and personnel at Galson Research Corporation developed the KOH/PEG/DMSO reagent and are very experienced with its use. They have tested the reagent on dioxin contaminated soils in the laboratory for the EPA's Hazardous Waste Environmental Research Laboratory, Cincinnati, Ohio. In addition, they have conducted field tests, similar to those proposed here, using the reagent to treat PCB contaminated soils at the Bengart and Memmel site, Buffalo, New York in July and August 1985.

Environmental Protection Agency: The EPA project officer for this effort is Mr Charles Rogers, Hazardous Waste Environmental Research Laboratory, 26 West St. Clair, Cincinnati, Ohio 45268, phone (513) 569-7757.

Air Force: The Air Force project officer for the chemical treatment of dioxin is Capt Edward Heyse, HQ AFESC/RDVW, Tyndall AFB, Florida 32403-6001, phone (904) 283-4628.

ADDENDUM TO RD&D PERMIT APPLICATION

The U. S. Air Force, Engineering and Services Center (USAF ESC), is proposing to conduct a full-scale Research, Development, and Demonstration (RD&D) project at the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. In order to conduct this demonstration, a RD&D permit is being sought from EPA Region IV. The technology to be demonstrated is incineration in a multi-unit transportable waste incineration system to demonstrate the destruction of dioxin and dibenzofurans in soil.

In conjunction with the above demonstration, the USAF ESC and EPA, Hazardous Waste Environmental Research Laboratory, **are proposing to jointly sponsor three tests of chemical treatment methods for chlorinated dioxin-contaminated soil.** These tests are **proposed to take place at the Herbicide Orange site at NCBC at the same time the full-scale demonstration takes place in** order to have the following advantages:

1. The NCBC site has been characterized for vertical and horizontal dioxin contamination through a soil sampling and analysis program.
2. Prior to operation of the full-scale demonstration, the incinerator feedstock (soil) will have been characterized for Appendix VIII constituents.
3. The full-scale demonstration will have carefully controlled soil excavation/handling capabilities. (**The proposed tests will require a total of about 12 yd³ of soil**)
4. The tests will be have benefit of the full-scale demonstration's contingency plans, sampling and analysis plans, and environmental protection, as well as being contained within the special controls attached to the full-scale demonstration.
5. Soil and materials used in the proposed tests will have the additional benefit of incineration in the full-scale demonstration. Therefore, none of the materials involved will leave the site.

Benefits to be derived from conducting the three tests are as follows:

1. Comparisons can be made of the decontamination efficiency and economics of thermal and chemical treatment of soil contaminated with chlorinated dioxins.
2. Comparisons can be made of the decontamination efficiency of slurry and in place chemical treatments.
3. The efficiency of chemical reagents to decontaminate surfaces can be tested.

A description of the three proposed tests is provided as Attachment 1. The tests will be conducted by an EPA contractor, Galson Research Corporation.

Contacts for the proposed tests are also provided in Attachment 1.

ADDENDUM TO RCRA RD&D PERMIT APPLICATION

for

FULL SCALE ROTARY KILN FIELD TEST
NAVAL CONSTRUCTION BATALLION CENTER
GULFPORT, MISSISSIPPI

Jointly sponsored study by

Air Force Engineering and Services Center
Tyndall AFB, Florida

and

U.S. Environmental Protection Agency
Hazardous Waste Environmental Research Laboratory
Cincinnati, Ohio

PURPOSE:

To test chemical treatment methods for soils contaminated with chlorinated dioxins.

BENEFITS OF RESEARCH:

- Compare decontamination efficiency and econmics of thermal and chemical treatment of soils contaminated with chlorinated dioxins.

- Compare decontamination efficiency of slurry and in place chemical treatments.

- Test chemical reagents capability to decontaminate surfaces.

PROPOSED TESTS:

Three tests are proposed. AFESC and EPA are interested in conducting any one, or all of these tests. We estimate all three tests could be accomplished with 12 cubic yards of soil. All tests will be conducted at the former Herbicide Orange storage site at the Naval Construction Battalion Center (NCBC), Gulfport, Mississippi. Chemical treatment tests will be held in conjuction with the thermal treatment tests.

<u>Chemical Reagent</u>: Treatment will be achieved with the reagent KOH/PEG/DMSO. This reagent consists of equal parts 50% potassium hydroxide in water (KOH), polyethylene glycol (PEG) and dimethyl

sulfoxide (DMSO). Treatment is achieved by the replacement of chlorine atoms from the chlorinated dioxin molecule with a glycol chain. Laboratory scale tests by Galson Research Corporation on spiked soils from NCBC showed reductions of 1,2,3,4 -tetrachloro-dibenzo-p-dioxin from over 2000 parts per billion (ppb) to less than one ppb. Ames tests performed by Research Triangle Institute showed that the dioxin-glycol complex is nonmutagenic. The other product of the reaction is the salt potassium chloride. Dimethyl sulfoxide acts as a solvent and catalyst for the reaction.

<u>Test 1. Slurry Process</u>: Feed stock for the incinerator will be used for a slurry test of the chemical treatment. Three tests will be conducted, each in a 55-gallon drum. About 100 lbs of soil will treated in each drum (about 0.1 cubic yards of soil, total) by an equal ammount of reagent. The reagent used in the first slurry test will be recovered and used in the second and third tests. A total of about 20 gallons of reagent will be used. Barrels will be heated to 150°C, and the treatment will last 1 to 8 hours. Water vapor from the drums will be vented to a drum filter containing activated carbon. Following treatment, the soil will be rinsed with water, and sampled for laboratory analyses. **All remaining wastes (treated soil, wash water, etc.) will be disposed of in the incinerator.**

<u>Test 2. In Place Treatment</u>: A 10 ft x 10 ft plot of soil contaminated with chlorinated dioxin will be identified and isolated with a temporary wooden barrier. The loose soil above the cement stabilized soil (hardpan) will be treated with the KOH/PEG/DMSO reagent in a ratio of soil to reagent of 5:1. For example, if 3 inches of soil is present on top of the hardpan, the ammount of soil treated would be 10'x10'x0.25' = 25 cubic feet. Assuming the specific weight of soil is twice that of the reagent, 10 cubic feet or 75 gallons of reagent would be used. The reagent would be worked into the soil with a hoe, and the plot covered with a sheet of plastic to protect the treated soil from rain. The plastic sheet, wooden barrier and hardpan will prevent any migration of reagent or reaction end-products. The treatment will last 7 days. At the end of the test, the soil will be sampled for analyses. The treated area will then be excavated to the depth that no reagent or contaminants are found by sampling and analysis. The excavated soil will be processed and used as feed stock for the incinerator. Assuming an excavation depth of two feet, the total ammount of soil excavated as a result of this test will be less than 8 cubic yards. Note that this test will be conducted after 1 November to avoid hurricane season.

<u>Test 3. Treatment of Surfaces</u>: This test will be conducted on the cement slab floor of Building 411 at the site. This cement floor may be contaminated with chlorinated dioxins, and is scheduled to be excavated and treated in the incinerator. We propose to take a sample of the floor prior to its excavation, and determine whether or not contamination exists on the surface. If the floor is contaminated, we will test the ability of the reagent to treat surface contamination. Part of the floor will

be divided into nine 5 ft x 5 ft squares. A barrier will be constructed around the slab to prevent any spillage of reagent onto the surrounding soils. Around the perimeter of each of these 25 square foot areas will be constructed a plastic barrier about 2 inches high. Three of these test plots will have a thin (one quarter inch deep) layer of reagent poured onto them. Three plots will receive a layer of the reagent applied with a brush, and the remaining three will remain untreated controls. The treatment will last 7 days. A sample of the cement slab from each test plot will be collected for analyses, and the entire floor will then be excavated and incinerated as planned. The ammount of reagent needed for this test should be less than one cubic foot (7.5 gallons). If the floor is excavated to a depth of six inches, the ammount of waste solid material affected by this test would be 6 x 25 ft^2 x 0.5 ft = 75 cubic feet, or about 3 cubic yards. The cement floor should be impermeable and the reagent will remain on the surface of the floor.

<u>Waste Disposal</u>: Chemical treatment with the reagent KOH/PEG/DMSO is still in the development phase. We are not trying to delist the soils treated in this manner. Instead, the purpose of these tests is to better understand the feasibility and economics of chemical treatment. We propose to dispose of all wastes in the incinerator. If all three tests are run, about 12 cubic yards of soil will be incinerated which would contain less than 110 gallons (about 0.5 cubic yards) of the reagent KOH/PEG/DMSO. The polyethylene glycol, dimethyl sulfoxide and the dioxin-glycol complexes will all be destroyed by incineration. Potassium chloride will remain unaffected but is harmless. Potassium hydroxide is a strong base. We do not anticipate any problems of putting it in the incinerator (in fact it may help neurtralize any acid formation), but it can be neutralized with a weak acid if necessary. Soil which contained the reagent will be analyzed for the reagent and its reaction end-products after it is incinerated.

ANALYSES:

Soil will be analyzed before and after testing. Sampling and analyses shall be conducted to thoroughly test the efficiency of the chemical treatment. **Soils will be analyzed for all chemicals necessar[redacted]elisting.** This will include chemical analyses performed for delisting of the thermally treated soils, and for the reagent and the chemical reaction end-products. The purpose of doing the delisting analyses is to gain information on the capabilities of the chemical treatment. If the test at NCBC is successful, we want enough data to justify using the chemical reagent as the primary treatment at some other site.

ATTACHMENT II

2. PROCESS DESCRIPTION

2.1 General Description

The Ensco incinerator (Mobile Waste Processor--MWP-2000) is designed and fabricated by the Pyrotech Division of Ensco Environmental Services Company (Ensco) in White Bluff, Tennessee. The MWP-2000 is a modular mobile incinerator system designed to destroy solid, semisolid, and liquid waste contaminated with PCBs. The system can also destroy waste contaminated with 2,3,7,8-TCDD. Before arrival onsite, the MWP-2000 will have undergone PCB test burns and RCRA trial burns for FO-20 through FO-28 wastes. Most of the system components are installed on flatbed trailers to facilitate the movement of the system from site to site to perform onsite cleanup of contaminated soils and other wastes.

Figure 2-1 shows the general arrangement of the system as it will be used at the NCBC. Figure 2-2 is a flow diagram of the system. The principal components of the system are the following:

- o Waste feed system
- o Rotary kiln incinerator
- o Secondary combustion system
- o Air pollution control system
- o Control room and laboratory.

The ancillary components of the system are the following:

- o Waste heat boiler and steam drum
- o Boiler makeup water treatment system
- o Treated soil removal system
- o Effluent neutralization and concentration system
- o Clean fuel holding tanks.

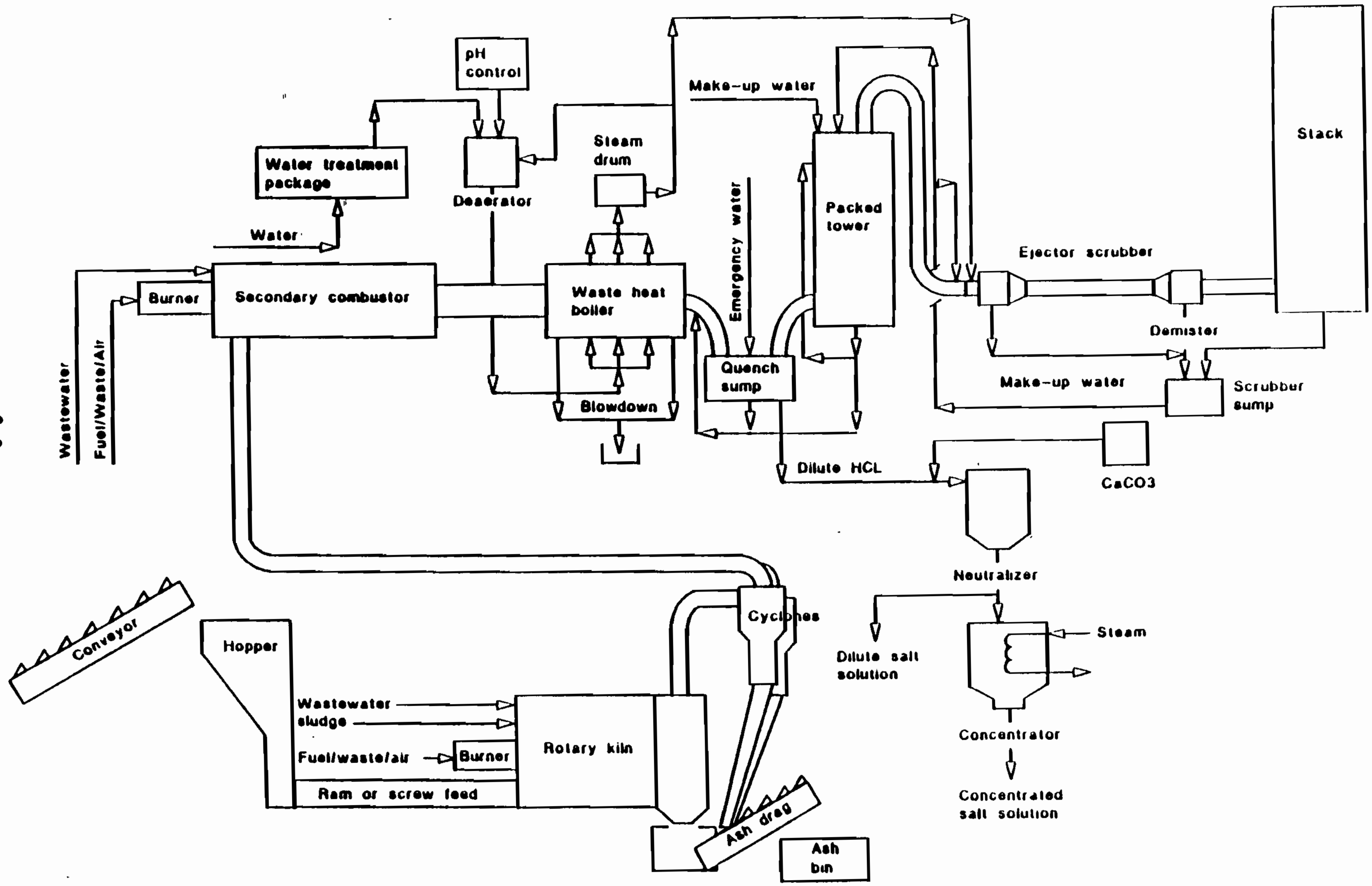

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Figure 2-2. Schematic flow diagram of MWP-2000.

Gases from the SCC then pass into the waste heat boiler to produce 250-psig steam for use downstream in the ejector scrubber. From the boiler, the gases then pass into the quench sump, which reduces the off-gas temperature for subsequent processing in the packed tower.

The packed tower removes 99% of the HCl gas produced during the combustion process. In the packed tower, the gases flow upward through the tower and are scrubbed by a countercurrent flow of water flowing over "tellerette" shaped packing material.

From the packed tower, the off-gas is drawn into the ejector scrubber. That device, which operates on the principle of an ejection pump, not only provides the prime motive force for moving the off-gases, but also acts to scrub particulates from the off-gas. Steam generated in the waste heat boiler serves as the motive fluid. The clean off-gas then is forced up the 35-ft stack.

2.2 Rotary Kiln

The primary function of the rotary kiln is to burn or gasify all combustible solid waste, including contaminated soils. The kiln is a carbon steel cylinder (6 ft, 7 in. in diameter, 30 ft long) mounted horizontally on a flatbed trailer. The first 10 ft of the kiln, which is the flame zone, is lined with 2-1/4 in. of insulating brick and 6 in. of fire brick. The remaining length of the kiln is lined with 6 in. of fire brick. The resulting interior dimensions are 5 ft, 3-3/4 in. ID for the flame zone and 5 ft 6 in. ID for the remaining length of 30 ft.

A 6-in.-high refractory dam is located at the downstream end of the kiln, and at several locations within the kiln. The purpose of these dams is to increase the residence time of the waste in the kiln.

a water seal. A chain drag conveyor removes the treated soil from the treated soil receiving tank and transfers it into portable bins, which are used to transport the treated soil to the clean soil storage area.

2.3 Secondary Combustion Chamber (SCC)

The purpose of the SCC or combustor is to completely burn the waste off-gas containing TCDD. The SCC is a carbon steel cylinder mounted horizontally on two supports on a flatbed trailer. It is lined with 2-1/4 in. of insulating brick and 4-1/2 in. of fire brick. The resulting interior dimensions are 79-1/2 in. inside diameter by 41 ft 6 in. long, providing a 1400 ft^3 effective volume.

Gases from the kiln arrive in the SCC via a carbon steel duct lined with 4 in. of castable refractory material and having a resulting 30 in. inside diameter. This duct introduces gases into the SCC tangentially through a rectangular port on the upper right side of the inlet end of the combustor. The duct is also equipped with an expansion joint that allows for thermal expansion and eases alignment during equipment setup.

By using a 24-MBtu/h vortex burner, the off-gases are heated to 2000 to 2400°F for 2.2 s in the presence of excess oxygen. That burner is designed to produce a short (4 ft), highly turbulent flame cone. To further ensure combustion turbulence, combustion air is introduced tangentially by a blower capable of delivering 5460 cfm at 35 in. water column pressure.

Because of the SCC residence time and temperature, 99.9999% of the TCDD in the off-gas will be oxidized to the simple combustion products of H_2O, CO_2, and HCl.

The gases exit the SCC through a 54-in.-ID carbon steel duct lined with 4 in. of castable refractory material. Although not shown in

The quench sump serves as a collection sump for excess recirculation water from the entire air pollution control train and also provides additional residence time for cooling gases passing through the quench system.

The quench sump is fabricated of 3/8-in. fiberglass reinforced plastic and is 8 ft long by 4 ft, 6 in. wide by 2 ft, 6 in. high. The outlet duct that conveys gases to the packed tower is also fabricated of fiberglass reinforced plastic.

The quench system is served by a pair of pumps (one of which is a standby pump) that recirculates water from the quench sump to the spray nozzles in the quench elbow. An in-line solids separator between the pumps and the spray nozzles removes particulates that could otherwise plug the nozzles. The quench sump is served by a raw water line that enables the adding of emergency makeup water to the sump in case of an emergency low-water condition.

2.5.2 Packed Tower

The packed tower removes HCl from the off-gas. The packed tower can remove 99% of the HCl leaving the quench sump, assuming a maximum loading of 1600 lb/h. The gases flow upward through the tower and are scrubbed by a countercurrent flow of water that is recirculated from the packed tower sump and from the ejector scrubber sump. The packed tower can also add makeup water to the system. Excess recirculation water is pumped to the quench elbow.

The packed tower is a fiberglass-reinforced plastic tank; it stands 14 ft tall and has a 6 ft inside diameter. It is packed to a 6-ft depth with 2 in. diameter plastic shapes called "tellerettes." A demister pad lies above the packing material.

2.5.4 Exhaust Stack

The exhaust stack is made of fiberglass-reinforced plastic. Three sections form a stack 35 ft, 6 in. high. Condensate formed in the stack drains to the ejector sump.

2.6 Process Monitoring

The following discussion describes the function of the most important instruments. Table 2-1 (presented in Subsection 2.7) lists the major process parameters and their normal control values. Table 2-2 (Subsection 2.8) lists all instruments and their ranges, function, and calibration frequencies.

2.6.1 Kiln Indicator and Control Devices

The indicating and control devices are described below. All measuring devices (e.g., flowmeters and thermocouples) are located on the kiln or in its outlet duct and its fuel and waste feed systems. All indicating devices (e.g., digital readouts and computer monitor) and controllers are located, except where otherwise noted, on the control panel in the control room and laboratory trailer described in a following section. The data acquisition and control computer, located on the control panel, is used to acquire and store selected critical measurements. Some of these measurements are instantaneously displayed on the computer monitor and can be printed on the computer printer. This computer is programmed to perform automatic waste cutoff (see following section) and can be programmed to control selected operating functions based on the information it acquires.

Kiln outlet temperature is measured by redundant platinum-rhodium thermocouples located in the outlet duct of the rotary kiln. One of these thermocouples is connected to a digital readout on the control room panel. The other is connected to the data acquisition and control computer, which displays readings on the computer monitor.

solenoid valve can be operated by the low-low liquid level switch on the steam drum to shut off fuel/waste flow to the kiln when water level in the drum falls below 25%.

Combustion air flow to the kiln burner is measured by an annubar flow measuring device in the combustion air supply duct. This device sends a signal to the data acquisition and control computer and a controller, which not only provides a digital readout but also controls a modulating butterfly valve on the combustion air supply line. The controller can be operated manually or automatically to control combustion air flow rate to the kiln burner. A differential pressure switch in the combustion air supply line signals the flame supervisor to shut off a solenoid valve to prevent fuel feed to the burner during startup when combustion air pressure is below a set limit.

Supplemental air to the kiln is regulated by a locally controlled butterfly valve in the supply duct delivering this air.

Solid waste feed through either a rotary auger or a ram feeder is not measured directly. Solid waste feed rates to the kiln will be determined by measuring or estimating the loading of such waste onto the feed conveyor or into the hopper. Control of the solid waste feed rate is accomplished by manually setting limiting switches on the ram feed. The data acquisition and control computer is programmed to shut off the hydraulic system that operates the ram feeder when any of the upset conditions delineated in Subsection 2.6.2 occur. Operation of the solid waste feed system is monitored by a remote TV camera that is connected to a TV screen on the control panel.

Indicating lights and lighted manual control buttons on the control panel report the status of all fuel, waste, wastewater pump, hydraulic pumps, and air blowers that serve the kiln. The on/off manual switches, plus the manually or automatically operated controllers, provide the means of fully operating the kiln from the control panel.

2.6.3 Waste Heat Boiler

Gas inlet and outlet temperatures, steam pressures, temperature and flow, steam drum water level, differential gas pressure across the boiler, and boiler makeup water flow are measured and recorded in the data acquisition and control computer, which displays this information on the computer monitor. The steam drum is equipped with high-high, high, low, and low-low switches. The high-high and low-low switches signal alarms on the control panel. The high switch shuts off makeup feedwater to the steam drum. The low switch orders the addition of makeup feedwater. A low-low signal shuts off fuel and waste feed to the rotary kiln and fuel to the secondary combustor to prevent damage to the boiler.

2.6.4 Quench System Controls

Quench system outlet gas temperature is measured by a thermocouple in the outlet elbow, which sends signals to a digital readout and the data acquisition and control computer on the control panel. Quench system inlet temperature is measured by the SCC outlet temperature (described in 2.6.2).

Recirculation flow from the quench sump to the quench elbow and from the packed tower to the quench elbow is measured by turbine-type flowmeters, which transmit signals to digital readouts on the control panel.

A pressure indicator (with a local readout) and low-pressure switch, which signals a low-pressure alarm, are installed on the recirculation line from the quench sump to the quench elbow. A solenoid-activated diaphragm valve, operated by a cycle timer, controls blowdown of solids from the solids separator in the quench recirculation line.

The quench sump is equipped with high-high, high, low, and low-low water level indicators. The high-high and low-low indicators activate light and sound alarms on the control panel. The high and low indicators manage the flow of recirculation water from the packed tower to the quench

The temperature of the steam delivered to the ejector scrubber is measured by a thermocouple that transmits measurements to a digital readout on the control panel and to the data acquisition and control computer. The delivery steam line is also equipped with a pressure indicator (with local readout) and a low-pressure switch that operates an alarm on the control panel.

The ejector scrubber sump is equipped with high-high, high, low, and low-low water-level indicators. The high-high and low-low indicators activate light and sound alarms on the control panel. The high and low indicators manage the delivery of makeup water to the ejector scrubber sump. The sump is also equipped with a sight glass to independently monitor the water level in the sump.

2.6.7 Stack Monitoring

Stack outlet gas temperature is measured by a thermocouple that transmits measurements to a digital readout on the control panel. The stack has a system to continuously collect gases that are transmitted to the oxygen, carbon monoxide, carbon dioxide, and oxides of nitrogen analyzers in the control room and laboratory trailer. Gas analysis measurements are recorded on a stripchart on the control panel and are transmitted to the data acquisition and control computer, which stores this information and uses it (except for oxides of nitrogen data) to operate the automatic waste feed cutoff and waste-to-fuel switching controls, when required. A more detailed description of the stack gas monitoring system is provided in Appendix D.

2.6.8 Automatic Waste Feed Shutoff Controls

The data acquisition and control computer is programmed to automatically switch feed to the burner from waste to fuel and to simultaneously and automatically cut off wastewater and sludge flows to the wastewater and the sludge injection nozzles and solid waste feed through the ram feed when any of the following conditions occurs:

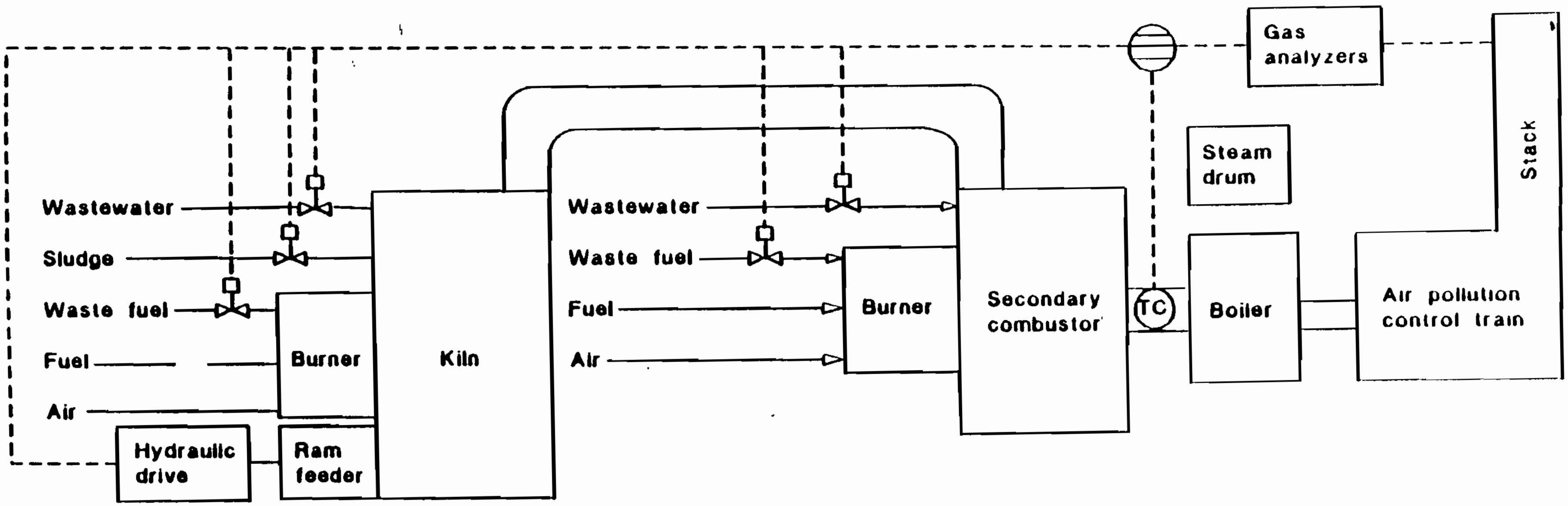

Figure 2-3. Automatic shutoff and feed switching controls for loss of designed thermal conditions.

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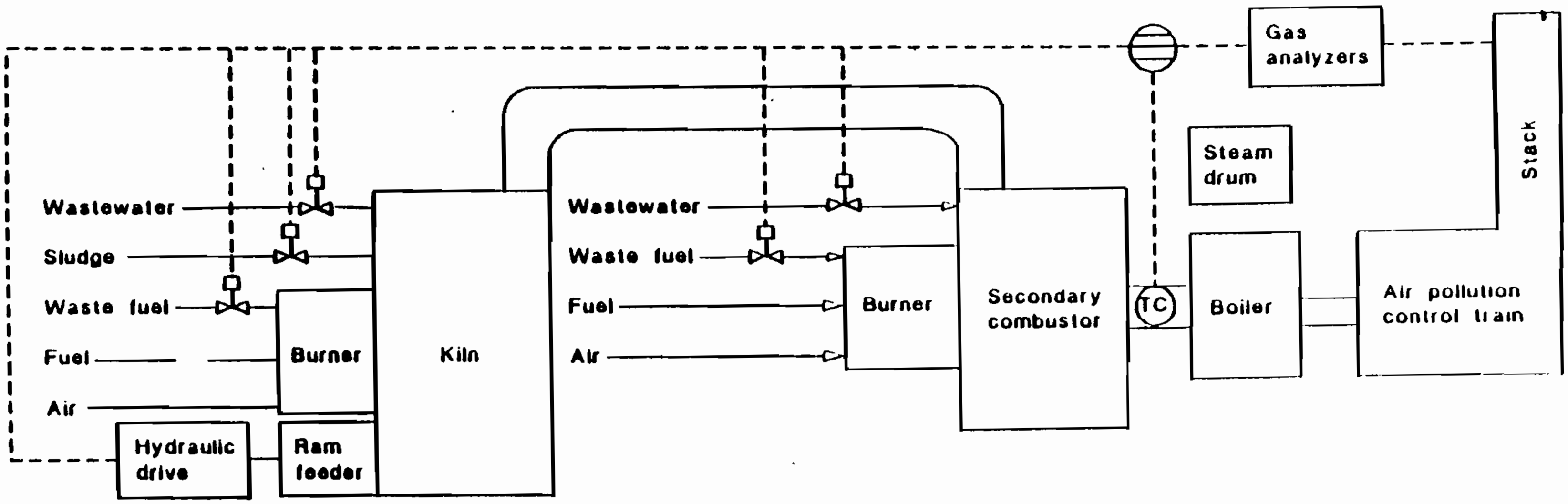

Figure 2-5. Automatic shutoff controls for loss of flame in secondary combustor.

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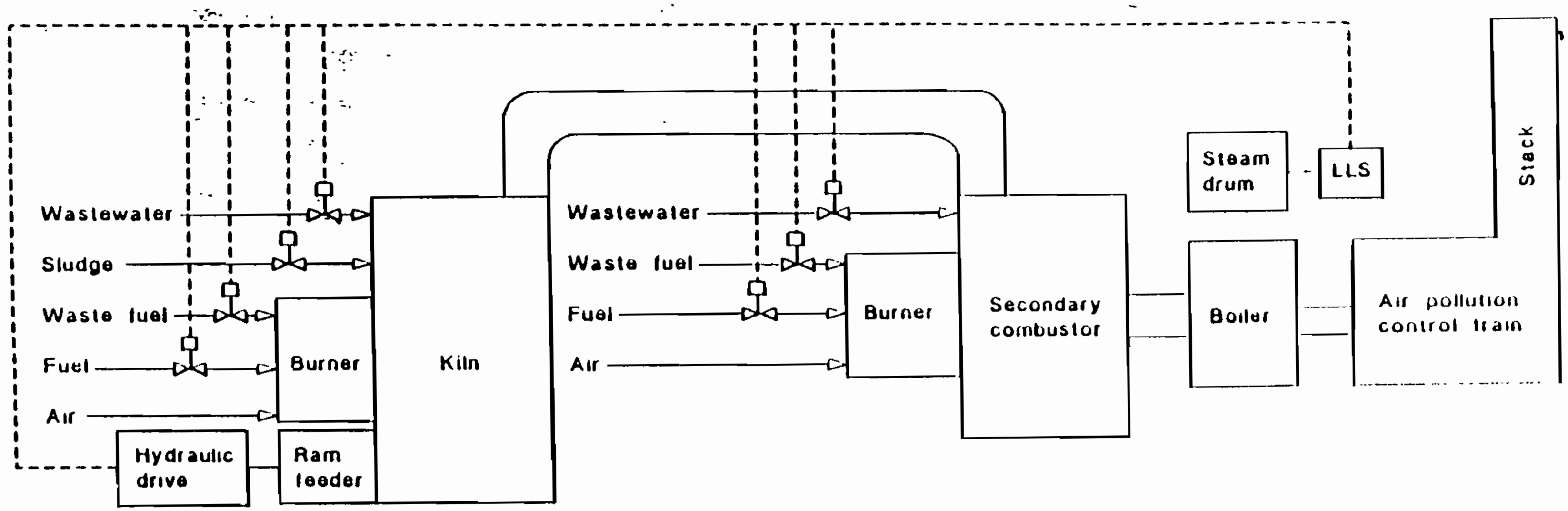

Figure 2-6. Automatic shutoff controls for low-low water level in steam drum.

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2.8 Inspection and Maintenance

Daily, weekly, monthly, and full shutdown instrument inspection and maintenance schedules are presented in Table 2-2.

2.9 Test Plan

In addition to the soil and fill materials identified in Section 1.3, small quantities of existing refuse and/or waste generated in association with the project will be fed to the incinerator. Such materials include personnel protective clothing, sampling equipment, combustible materials from erection of the process unit, decontamination materials, and chipped concrete from concrete pads on the storage site.

The MWP-2000 will be inspected before arrival onsite. The following gives a brief operation plan for the proposed project:

1. Transport equipment to NCBC.

2. Set up equipment (Figures 2-1 and 5-1) (approximately 6 weeks).

3. Inspect equipment. (A registered professional engineer will certify that equipment has been erected in accordance with permit conditions.)

4. Perform thermal test (approximately 2 weeks).

5. Perform initial test runs to provide performance verification data and any data required through EPA delisting process.

6. Hold period to obtain analytical results for 5 above.

7. Following successful completion of 5 and 6, begin 150-day operational period.

8. Decontaminate equipment (approximately 1 week).

9. Shut down equipment.

10. Disassemble system (5 to 6 weeks). (A registered professional engineer will certify that equipment has been shut down and disassembled in accordance with permit conditions.)

11. Remove equipment from NCBC.

TABLE 2-1. (continued)

Parameter	Method	Instrument	Method of Control	Normal Control Value
Gas residence time	Calculated from mass flows and gas temperature	NA	Adjust mass flows	2 to 2.1 s
Combustion efficiency	Calculated from stack gas CO and CO_2	Stack gas monitors	NA	99.9%
WASTE HEAT BOILER				
Outlet gas temperataure	NA	Thermocouple	NA	450°F
Steam pressure	NA	Pressure transducer	Steam drum vent control valve	220-240 psig
Steam drum level	NA	Level switches	Makeup flow control valve	40-60%
Makeup water flow rate	Orifice	ΔP transducer	Flow control valve	20-30 gpm
QUENCH SYSTEM				
Recirculation flow rate	Orifice	ΔP transducer	Constant	100 gpm
Makeup water flow rate	Orifice	Δ transducer	Flow control valve	15 gpm
Outlet gas temperature	NA	Thermocouple	NA	190°F
PACKED TOWER				
Recirculation flow rate	Orifice	Δ transducer	Constant	170 gpm
Makeup water flow rate	Orifice	ΔP transducer	Flow control valve	15 gpm

TABLE 2-2. EQUIPMENT/INSTRUMENT LIST

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Rotary Kiln		
Waste feed to burner, lb/min	1	Continuous
Clean fuel feed, lb/min	1	Continuous
Sludge feed, lb/min	1	Continuous
Wastewater feed, lb/min	1	Continuous
Combustion air feed, lb/min	1	Continuous
Vacuum, in. water	1	Continuous
Outlet gas temperature, °F	1	Continuous
Liquid waste and fuel feed lines	2	Inspect for leaks. Repair if found.
Pump and strainer on operating waste fuel feed line	2	Switch feed to alternate pump. Remove and clean strainer.
Pump on operating clean fuel feed line	2	Switch feed to alternate pump.
Pump and strainer on operating wastewater feed line	2	Switch feed to alternate pump. Remove and clean strainer.
Combustion air and supplemental air blowers	2	Check for overheated bearings and vibrations. Repair if found.
Solid waste feed conveyor and ram or screw feed	2	Inspect for visual signs of malfunction. Repair if found.
Sight glass into kiln and TV camera lens	2	Clean.

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Combustion air and supplemental air blowers	4	Inspect suction filters and replace cartridges if necessary.
Roller bearings	4	Lubricate.
Solid waste feed conveyor	5	Lubricate roller bearings.
Refractory	5	Inspect for loose brick, spalling, cracking, or other damage. Repair if necessary.
Burner	5	Remove and clean nozzle and inspect for wear or damage. Repair if necessary.
Flame detector		Clean flame detector lens.
Cyclones	5	Inspect refractory for damage. Repair if found.
Treated soil removal system	5	Inspect chain drag for excessive wear. Replace if found.
Waste feed system	5	Clean and inspect heaters on waste fuel feed line. Repair if necessary.

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Combustion air blower	2	Check for overheated bearings and vibrations. Repair if found.
Burner	2	Rod center tube of nozzle.
Sight glass into combustor and TV lens	2	Clean.
Oxygen and CO monitors	2	Calibrate (zero and span). Check flow rate and correct if necessary. Inspect desiccator. Replace desiccant if necessary.
Feed pumps on waste fuel, clean fuel and wastewater feed lines	3	Inspect oil level. Fill if necessary.
Strainer on operating clean fuel feed line	3	Remove and clean.
Combustion air blower	3	Lubricate.
Propane tank serving burner pilot	4	Check tank pressure. Fill if necessary.
Oxygen and CO monitors	4	Calibrate (four points on scale).
Burner	4	Visually inspect externally for signs of leaks, wear, overheating or damage.

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
CO monitor	5	Clean sample cell.
Combustion air blower	5	Inspect vanes for damage or excessive wear. Repair if found.
Waste Heat Boiler		
Outlet gas temperature, °F	1	Continuous
Steam drum water level, %	1	Continuous
Make-up water flow, gpm	1	Continuous
Pressure drop, in. water	1	Continuous
Steam temperature, °F	1	Continuous
Steam pressure, psig	1	Continuous
Steam flow, lb/min)	1	Continuous
Boiler feed pumps	3	Inspect oil level. Fill if necessary.
Strainers	3	Remove and clean.
Boiler	5	Inspect boiler tubes and end plates for solids buildup and corrosion. Clean and repair if necessary.
Boiler feed pumps	5	Lubricate bearings.
Quench System and Packed Tower		
Pressure drop, in. water	1	Continuous
Recirculation flow, gpm	1	Continuous

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Ductwork	5	Inspect for solids buildup, corrosion, and heat damage. Clean and/or repair as necessary.
Quench elbow	5	Clean and inspect nozzles.
Solids separators	5	Clean and inspect for operability. Repair as necessary.
Ejector Scrubber and Stack		
Inlet gas temperature, °F	1	Continuous
Outlet scrubber gas, °F temperature	1	Continuous
Pressure drop, in. water	1	Continuous
Inlet steam pressure, psig	1	Continuous
Recirculation flow, gpm	1	Continuous
Makeup water flow, gpm	1	Continuous
Outlet stack gas, °F temperature	1	Continuous
Oxygen, %	1	Continuous
Carbon dioxide, %)	1	Continuous
Carbon monoxide, ppm	1	Continuous
Nitrogen oxides, ppm	1	Continuous
Combustion efficiency, %	1	Continuous
Entire system and associated piping	2	Inspect for leaks. Repair if found.

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Oxygen, CO, CO_2, NO_x and hydrocarbon analyzers	2	Calibrate (zero and span).
pH and conductivity meters	2	Calibrate.
Pump	3	Inspect pump flow output. Replace pump head if necessary.
Oxygen, CO, CO_2, NO_x, hydrocarbon analyzers	3	Calibrate (four points on scale).
CO and CO_2 analyzers	4	Clean sample cell.
Oxygen analyzer	4	Check fuel cell. Replace if required.
NO_x analyzer	4	Clean capillary orifice.
Hydrocarbon analyzer	4	Check pump pressure and photoionizacell output. Correct if necessary.
Monitoring system	5	Drain and clean or replace tubing.
<u>Neutralization and Concentration Unit</u>		
Entire unit and associated piping	2	Inspect of leaks. Repair if found.
Concentrator recirculation pump	2	Check to ensure steam flow to pump casing.

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Strainers on raw water line, treated water line, salt solution feed line and boiler feed line	3	Remove and clean.
Saltwater solution tank	4	Empty, clean and refill.
Mass flow meters on treated water line, de-aerator inflow line and boiler makeup water feed line	5	Calibrate.
Air Supply System		
Compressor	2	Check for unusual noise or vibration. Repair if found. Inspect oil level. Fill if required.
Air tank	2	Drain condensate.
Regulators on instrument lines	2	Drain condensate.
Compressor	3	Clean air inlet filter.
Air tank	3	Inspect operability of pressure relief valve.
Compressor	4	Clean after-cooler tubes and cooler fins.

TABLE 2-2. (continued)

Equipment/Instrument	Inspection/ Calibration Frequency[a]	Inspection/ Maintenance
Loose Solids Staging Unit		
Wastes staged	2	Inspect for improper segregation of batches and leaking containers or items. Correct if found.
Containment System	2	Inspect for standing water or liquids. Remove if found.
Drum and Solids Processing Units		
Fugitive emission control equipment and procedures	2	Inspect for malfunction or improper implementation. Correct if found.
Containment system	2	Inspect for standing water or liquids. Remove if found.
Pumps	3	Inspect oil level. Fill if necessary.
Hydraulic drives	3	Inspect hydraulic fluid levels. Fill if necessary. Inspect hoses for leaks. Repair if found.
Motors and equipment bearings	4	Lubricate.

ATTACHMENT IV

ATTACHMENT III

ATTACHMENT VI

4. EMERGENCY AND CONTINGENCY PLAN

4.1 Emergency Response

This section provides generalized guidance for contingency events associated with all activities at the NCBC and specifically provides for the demonstration of the Ensco technology at the former HO storage site.

4.1.1 General Emergency Practices at NCBC

The emergency practices for NCBC personnel are outlined below.

1. Upon evacuation notice by NCBC, all personnel involved in this project must be prepared to evacuate the NCBC and do so when ordered.

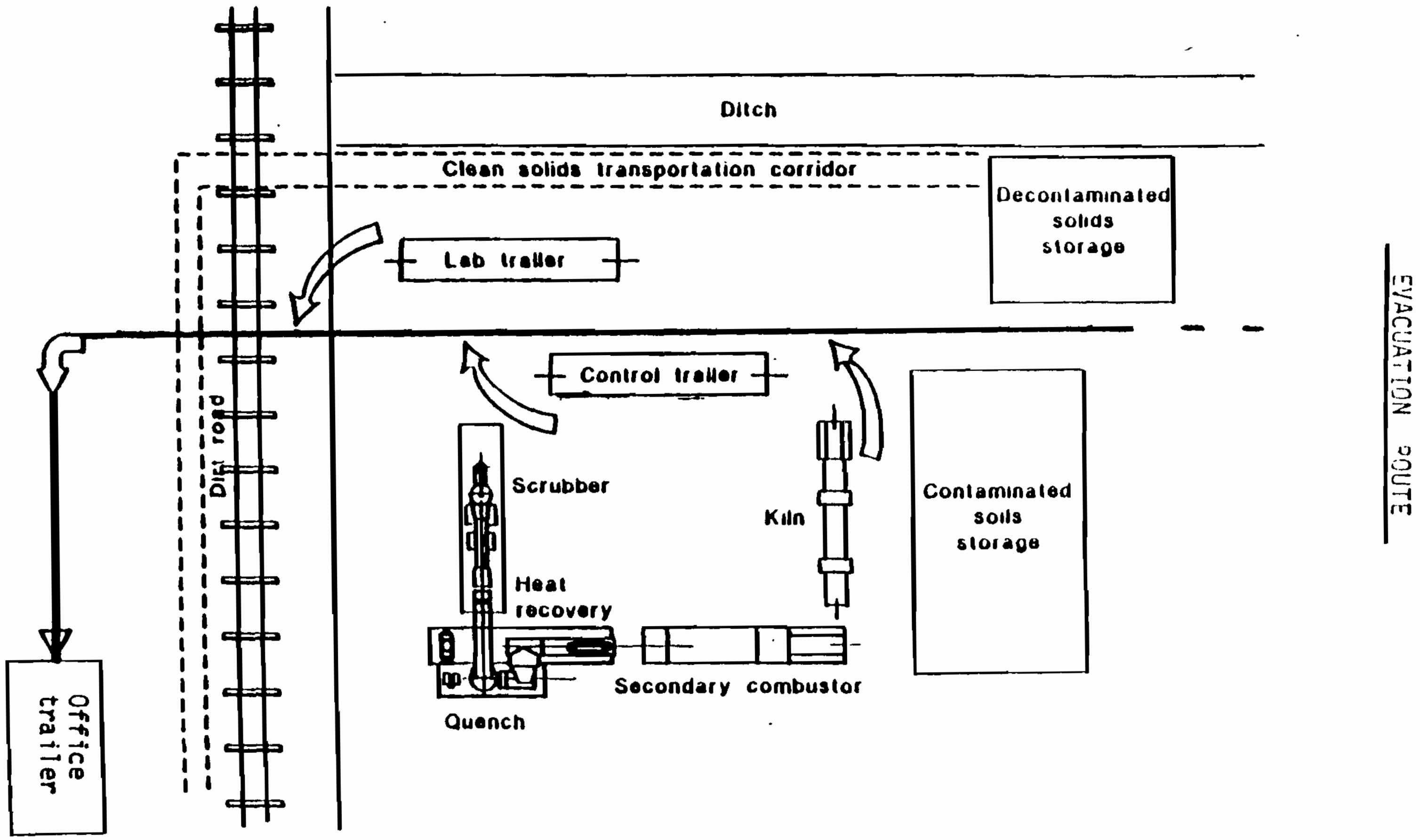
2. NCBC requirements regarding hurricane protection will be observed. Specifically, equipment will have appropriate tiedowns in case of hurricanes.

4.1.2 Emergency Practices for NCBC HO Site

In addition to the preceding emergency practices, specific required practices related to HO site activities are presented below. Names and telephone numbers of emergency action coordinators involved with the demonstration and other responsible individuals will be provided to EPA at a later date for incorporation into a permit. The next two pages will be posted in work areas at the HO site prior to any onsite activity:

1. All personnel must be trained in the use of the personnel protective equipment specified in Section 5.

2. All personnel must be familiar with and implement procedures for health and environment for exposure or release to the environment of dioxin.


Ditch
Clean solids transportation corridor
Decontaminated solids storage
Lab trailer
Control trailer
Dirt road
Scrubber
Heat recovery
Quench
Secondary combustor
Kiln
Contaminated soils storage
Office trailer
EVACUATION ROUTE

a. Soil handling, where the total quantity of soil to be handled over the 150-day operating period is approximately 11,000 yd^3. The vapor pressure of TCDD, 2,4,5-T, and 2,4-D is extremely low; and the primary means of migration from the immediate site is airborne particles. Therefore, all appropriate provisions will be taken to avoid fugitive dust emissions during soil handling (see Section 5 for ambient air monitoring and soil handling procedures).

4.3 Failure Modes

Postulated failure modes that could result from the demonstration activities on the HO site at NCBC are described below. Only the most likely failure modes or worst-case accident scenarios are presented.

4.3.1 Combustion Efficiency

When combustion efficiency drops below 99% and/or excess oxygen in the stack gases drops below 3%, the data acquisition and control computer will cut off all waste feeds to both units. The system will operate on fuel oil only until the operator can determine the cause of the malfunction and safely reinitiate the feeding of wastes.

4.3.2 Loss of Burner Flame

In the event of a loss of flame in the kiln, the kiln's ultraviolet flame detector will signal the data acquisition and control computer to cut off all fuel and waste feed to that unit; operation of the SSC will be maintained at normal operating conditions. The operator will relight the flame following normal operating procedures. When operating conditions are reestablished, the operator will reinitiate the feeding of soil to the kiln.

In the event of a loss of flame in the secondary combustion chamber, the flame supervisor serving that unit will signal the data acquisition and control computer to perform the following functions: cut off fuel feed to the SCC and cut off all waste feed to the kiln.

The operator will relight the flame and maintain the kiln at normal operating conditions. When normal operating conditions are reestablished in the SCC using diesel fuel, the operator will reinitiate waste feed to the kiln.

4.3.3 Steam Drum Water Loss

If the water level in the steam drum falls below the 25% level, the low-low liquid level switch on the steam drum will alert the operator to shut off all waste and fuel feed to the kiln and the SCC. Upon hearing the alarm, the operator will perform the following steps:

- Cut off steam flow to the ejector scrubber
- Open the emergency vent on the SCC outlet duct
- Begin pumping makeup water into the steam drum
- Discontinue waste feed.

The operator then will ascertain the cause of the low water problem and will restart the system only after solving the problem.

4.3.4 Primary Power Failure

If a power outage occurs, operators will manually start the standby generator. The operator will then perform the following steps:

- Discontinue all waste and fuel feed to the kiln and SCC
- Restart the recirculation pumps in the air pollution control train

- Restart rotation of the kiln

- Restart the combustion air blowers

- Relight the burners in both the kiln and the SCC.

These steps will reestablish normal operating conditions in the kiln and SCC with the burning of diesel fuel only. If normal power is restored after the reestablishment of operating conditions, the operator will reinitiate waste feed to the kiln. If power is not restored within one hour after normal operating conditions have been reestablished, the operator will begin a normal shutdown of the system.

4.3.5 Loss of Coolant Makeup Water

If an interruption occurs in the makeup water supply system, an alarm will alert the operator to cease waste feed operations and initiate corrective actions.

A loss of makeup water would cause the steam drum to become depleted of water within 3.5 min. As a result, the quench system would fail, causing excessive temperatures in the packed tower and other equipment downstream. Such a series of events is unlikely.

If loss of quench water does occur, no health hazards would occur since the dioxin would be destroyed by the residual heat in the SCC and the kiln.

4.3.6 Computer Failure

Failure of the data acquisition system computer is an anticipated event. However, a computer "crash" should not cause any secondary process accidents because the entire process is manually operated (with the exception of the flame supervisor).

ATTACHMENT V

5. HEALTH AND ENVIRONMENTAL PROTECTION

5.1 Health and Safety

5.1.1 Introduction

2,3,7,8-TCDD can be found as a contaminant of chemicals such as 2,4,5-trichlorophenoxyacetic acid (a herbicide), 2,4,5-trichlorophenol (used in the production of pesticides or herbicides), or hexachlorophene (a skin cleaner). It can also be a breakdown product resulting from the exposure of chlorinated hydrocarbons, such as PCBs, to intense heat. Like other organochlorine compounds, such as DDT and PCBs, dioxin is persistent in the environment and accumulates in living tissues.

All Ensco employees will receive the appropriate level of training before arriving at the site. A training program for dioxin and any other possible hazardous chemicals that may be used in conjunction with this project will be carried out. In general and as a minimum, the program will include:

- o The specific nature of the operations that could result in exposure to dioxin
- o The purpose, proper selection, fitting, use, and limitations of respirators and protective clothing applicable to dioxin work
- o A description of the medical surveillance program
- o Information concerning the adverse health effects associated with exposure to dioxin and other chemicals that will be used
- o Routes of exposure (skin penetration, inhalation, and ingestion)
- o The engineering controls and safe work practices associated with the employee's job assignment.

5.1.3 Program Structure

The project Health and Safety Officer (with the assistance of subordinate employees) will be responsible for the coordination of this plan. The Officer (or representative) will be onsite for the duration of the job. Liaison with officers or representatives of USAF or EG&G Idaho on matters relating to safety and health will be handled by the project Health and Safety Officer.

The Project Leader is responsible for field implementation and enforcement of the health and safety plan. This includes communicating the specific requirements to all personnel, conducting audits, and consulting with the Health and Safety Officer regarding appropriate changes in safety and health requirements.

All onsite personnel are responsible for understanding and complying with the requirements of this plan. The Health and Safety Officer will have the authority to temporarily dismiss any person who fails or refuses to comply with this plan or the orders issued by the Officer pursuant to this plan. The Health and Safety Officer will direct all responses to an emergency situation (details of Emergency Response actions are presented in Section 4).

5.1.4 Regulated Areas

Zones delineated as 1 and 2 on the site will be fenced and controlled to prevent unauthorized entry. Otherwise, Zones 1, 2, and 3 will be marked by perimeter barriers and signs and will have controlled access points. All persons who are authorized to enter the site will be informed as to the locations of the zones and the rules that apply to each.

5.1.4.1 Zone 1. Zone 1 will cover all site areas where workers are likely to come into direct contact with wastes or be exposed to volatilized contaminants or contaminated dust.

2. Herbicide Orange:

2,4-D = 10 mg/m^3 air (8-h time-weighted average)

2,4,5-T = 10 mg/m^3 air (8-h time-weighted average)

4. Engineering controls and operational procedures will be used to maintain levels of hazardous materials within the limits set forth above. This may be accomplished by the use of dust-suppression techniques with 2,3,7,8-TCDD and closed systems and ventilation controls. These controls will be coupled with protective equipment of the appropriate level for exposures encountered.

5.1.5.2 Protective Equipment. All persons who enter Zones 1, 2, or 3 must wear the protective equipment specified below. Additional protective equipment may be required by the Health and Safety Officer.

Zone 1 Protective Equipment: All persons who enter a Zone 1 must wear the following protective equipment:

- o Hard hat
- o Safety glasses or a full-face shield
- o An organic vapor/acid gas (OV/AC) respirator equipped with a disposable cartridge and dust prefilter as specified by the Health and Safety Officer, or an air-supplied full-face respirator when ordered by the Health and Safety Officer

- Coveralls (cotton or disposable)

- Outer disposable coveralls (Tyvek for particulates or Saranex for liquids)

- Steel-toed safety shoes or boots with disposable over-boots taped to the disposable coveralls, or steel-toed neoprene boots taped to the disposable coveralls

- Nitrile outer gloves taped to disposable coveralls

- Disposable inner gloves under neoprene gloves when there will be direct contact with wastes.

Zone 2 Protective Equipment: All persons who enter a Zone 2 must wear the following protective equipment:

- Hard hat

- Safety glasses.

They must also carry the following:

- An OV/AG respirator equipped with a disposable cartridge and dust prefilter as specified by the Health and Safety Officer. This respirator must be available to be worn on the face when ordered by the Health and Safety Officer.

All persons who enter and remain in a Zone 2 for more than 6 h must wear steel-toed safety boots and coveralls.

Zone 3 Protective Equipment: No personnel protective equipment must be worn in Zone 3 except when the Health and Safety Officer orders that the following equipment be worn because of construction or other activity in the zone:

- A hard hat

- Safety glasses.

5.1.5.3 Entry and Exit Procedures. The following procedures will be observed by all personnel entering Zones 1, 2, or 3. The Health and Safety Officer can deny entrance into a zone of the requirements are not met.

Each person entering a Zone 1 must:

1. First, don the protective equipment specified in the previous section for Zone 1 or as otherwise specified by the Health and Safety Officer

2. Be certified under the Medical Monitoring Program (as identified in Section 5.6)

3. Be accompanied by another person at all times when in the zone.

Each person entering a Zone 2 who will remain in the zone for less than 6 h must first don the protective equipment specified in the previous section, or as otherwise specified by the Health and Safety Officer. Additionally, if the person has accumulated a residency of more than 40 h in Zones 1 and 2, that person must be certified under the Medical Monitoring Program (as identified in Section 5.1.6).

Each person entering a Zone 2 who will remain in the zone for more than 6 h must first don the protective equipment specified in the previous section, or as otherwise directed by the Health and Safety Officer and must be certified under the Medical Monitoring Program (Section 5.1.6).

Each person who enters a Zone 3 must first don the protective equipment specified in the previous section, or as otherwise specified by the Health and Safety Officer.

Each person who exits a Zone 2 and enters a Zone 3 to take a break, have a meal, or temporarily stay or work in Zone 3 must pass through the personnel decontamination unit to:

1. Remove mud and dirt from outer clothing

2. Thoroughly wash hands and face.

Each person who exits a Zone 2 and enters a Zone 3 to leave the site (except those that have been in the zone for less than 6 hours) must pass through the personnel decontamination unit to:

1. Remove mud and dirt from outer clothing

2. Remove all protective equipment

3. Shower

4. Change into street clothes.

Except for washing hands and face, no health and safety procedures for exiting from Zone 3 will be in force unless the Health and Safety Officer has required that protective equipment be worn. In such cases, the equipment will be removed before exiting the zone.

5.1.6 Medical Monitoring Program

Each person who is expected to work in Zones 1 or 2 will be required to have a medical examination by a company-retained doctor who finds the person fit to work in an environment where hazardous wastes are being handled. This medical examination will include the following: medical history, physical examination, EKG stress test, urinalysis including microscopic, chest x-ray, cardiovascular and respiratory test, pulmonary function test, hematology tests, methemoglobin test, audiometry test.

dust level falls below the criterion levels. Full-face air-purifying cartridge respirators will normally be used. If the dust cannot be lowered to the acceptable level, workers will be required to wear a demand-type air-supplied full-face respirator. Worker exposure to the dust will also be monitored daily using a personal sampler with filter cassette (and perhaps cyclone) and analyzed gravimetrically. The same criteria will be used to judge exposure limits.

Zone 2 Monitoring: Monitoring in this zone will be carried out generally the same as in Zone 1, except that the frequency will be two times per day. An industrial hygienist will conduct such monitoring at random to avoid biasing results. Time-weighted average filter samples will be taken for a full shift. Administrative controls for working in this zone will be identical to those in Zone 1.

Zone 3 Monitoring: No occupational air monitoring will be routinely performed in Zone 3 areas.

The Health and Safety Officer will calibrate each instrument to be used for the above analyses in accordance with the manufacturers' specifications and before and after each use. A background reading in Zone 3, upwind from all prevailing work activity, will be used in the event that results would be significantly biased by background dust. A wind direction indicator will be located on the stack of the incinerator to indicate upwind and downwind areas.

5.1.7.2 Other Occupational Health Protection Procedures. Persons required to wear disposable coveralls and who do not work in an air-conditioned environment will be allowed appropriate rest periods as specified by the Health and Safety Officer. All such personnel will be specially trained to recognize symptoms of heat stress and watched closely by the Health and Safety Officer, or a subordinate employee, for signs and symptoms of heat-related illness. Work break schedules will be carefully planned to avoid heat stress.

When leaving the contaminated area, personnel will be required to:

1. Wash or brush mud and dirt from their boots and outer clothing and remove boots and disposable equipment at the outside wash pad

2. Remove nondisposable clothing, as required, in the dirty changeroom

3. Wash or shower, as required, in the shower and wash room

4. Change into street clothes in the clean changeroom.

When entering the contaminated area, personnel will be required to remove all street clothing and put on disposable and clean protective clothing in the clean area. [Reusable equipment (for example, respirators, boots, and hard hats) that have been decontaminated may also be put on in a designated section of the clean area.]

Disposable equipment will be placed in bins or drums on the outside wash pad and will be subsequently burned in the incinerator or otherwise properly disposed of as a hazardous waste. Nondisposable coveralls will be laundered periodically. After each on-shift use, respirator face masks will be cleaned in warm water and detergent, and the cartridges and dust filters of the OV/AG respirators will be replaced. Wastewaters generated at the personnel decontamination unit will be burned in the incinerator, or otherwise properly disposed of as a hazardous waste.

The interior of the personnel decontamination unit will be cleaned daily. Lavatories will be provided in the decontamination unit.

5.1.9 <u>Health and Safety Training/Recordkeeping</u>

5.1.9.1 <u>Training</u>. All personnel who will frequently work in Zones 1 and 2 will be given the following training before they begin work:

- Roles and duties during an emergency

- The safe operation of the equipment that each person will operate.

Additionally, at least two persons on each shift will be required to have valid American Red Cross, or equivalent, certificates in basic first-aid and CPR. (See Section 4 for Emergency Response details.)

All personnel who frequently work in Zones 1 and 2 will be required to attend weekly health and safety meetings to reinforce the above training.

5.1.9.2 Inspections. Table 5-1 lists items that will be inspected daily by the Heath and Safety Officer. In addition, the Health and Safety Officer will continuously observe compliance with this Health and Safety Plan.

5.1.9.3 Records. The Health and Safety Officer will maintain the following records:

- A daily log of persons who entered a Zone 1 or 2

- A log of the daily calibration of and measurements made with all air monitoring instruments

- A log of daily inspections

- A weekly updated inventory of personnel protective equipment, fire extinguishers, and emergency equipment

- A log of health and safety training sessions and meetings held.

These records will be kept in the project office.

5.2.3 Effluent/Waste Control and Monitoring

Requirements for control of fugitive dust emissions (i.e., no visible dust plumes), especially during soil handling, will be met through careful handling and application of dust suppressants whenever necessary. Because the Ensco incinerator will have been demonstrated to achieve 99.9999% destruction and removal efficiency, perimeter air monitoring for process emissions will not be of great concern. However, an ambient air monitoring program will be conducted to determine the fugitive particulate concentrations during soil-handling operations. The fugitive particulate matter will be sampled using flow-controlled, high-volume samplers operating at a minimum flow rate of 40 cfm. The high-volume samplers will be located and operated during this demonstration as shown in Table 5-2. In addition, the soil will be sampled and analyzed after treatment to meet criteria established in Appendix A.

Dilute HCl from the quench sump will be neutralized if necessary to a pH of 6.5 to 7 by the addition of $CaCo_3$. Water from the ejector scrubber will be neutralized to a pH of 6.5 to 7 in the scrubber sump through NaOH injection. From the sumps, the water is passed through tandem activated-carbon filters, then to a holding tank. The water will be held in the tank to allow a representative sample to be drawn according to sampling protocol for tanks in SW 846. The sample will be analyzed for TCDD using EPA Method 8280. If tank contents are $\leq$10 parts per trillion (ppt), the water will be transferred to the lift station at NCBC for discharge to the publicly owned treatment works (POTW).

5.2.4 Soil Handling

Approximately 11,000 yd^3 of contaminated soil will be treated in the incinerator. Figure 5-1 illustrates the location of the major process components in relation to the HO site (see Figure 2-1 for specific site layout).

Dilute HCl from the quench sump will be neutralized if necessary to a pH of 6.5 to 7 by the addition of $CaCo_3$. Water from the ejector scrubber will be neutralized to a pH of 6.5 to 7 in the scrubber sump through NaOH injection. From the sumps, the water is passed through tandem activated-carbon filters, then to a holding tank. The water will be held in the tank to allow a representative sample to be drawn according to sampling protocol for tanks in SW 846. The sample will be analyzed for TCDD using EPA Method 8280. If tank contents are $\leq$10 parts per trillion (ppt), the water will be transferred to the lift station at NCBC for discharge to the publicly owned treatment works (POTW).

The permit applicant revised the neutralization range to pH 6 to 9 on June 2, 1986. The applicant acknowledged that discharge to the POTW would require approval by the State of Mississippi.

Contaminated soil will be excavated using 20- x 20-ft grids, to a depth specified by the results of the soil mapping program

Each excavated grid will be sampled to ensure that the TCDD and total CDD and CDF limits as stated in Appendix A are met. Appropriately sized equipment will be used to excavate the contaminated soil on an as-needed basis, usually daily. The soil will be transferred to roll-off bins on dump trucks, then to a conveyor belt that feeds to the feed hopper. This portion of the process will be skirted to prevent escape of fugitive dust. Before operation, a route through the site will be identified and designated for transport of all contaminated soil.

The treated soil will be transferred to roll-off bins on dump trucks. The treated soil will be held in batches in each bin, pending verification of meeting criteria as defined in Appendix A, Sampling and Analysis Matrix. When verification has been completed, the soil will be reloaded and transported via a designated clean route to a verified clean spot for placement back on the HO site.

All activities will be stringently controlled to prevent dust generation. The USAF had agreed to the U.S. Navy's requirement that no visible dust plumes will be generated during any activities associated with the field demonstration. Therefore, water will be used liberally for dust suppression whenever necessary. In addition to the constant visual monitoring, the area will be monitored through the ambient air monitoring program (see Subsection 5.2.3).

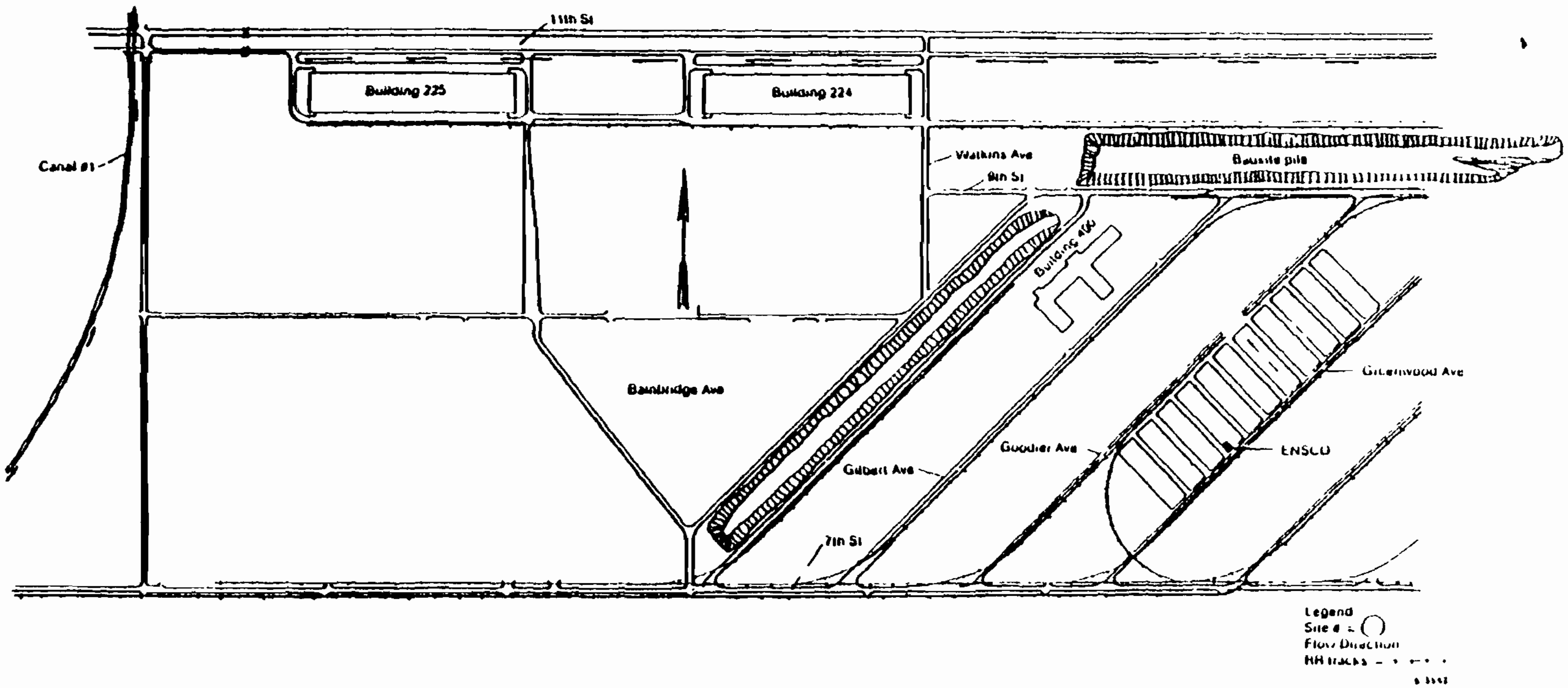


Figure 5-1. Location of Ensco equipment at NCBC.

6. MONITORING PLAN

6.1 Independent Verification

The demonstration process will be sampled by an independent sampling team, and those samples analyzed by an independent laboratory. This will provide independent verification of process performance. Environmental monitoring (as specified in Section 5) will also be performed by contractors. Specific information is pending contract award. Analytical data validation will be performed by EG&G Idaho. Whenever available, EPA protocol will be adhered to (specifically SW-846 for sample collection and analysis and Dioxin-Containing Wastes; Rule).

The Statement of Work for the independent sampling and analyses tasks is presented in Appendix E. The Sampling and Analysis Matrix is presented in Appendix A. The sampling plans and quality assurance (QA) programs for contract work will be provided as appendices to this document, pending contract award.

Independent verification will be carried out through the duration of this project, and specific requirements will be defined in a Scope of Work pending subcontract award. Process monitoring will be conducted onsite by Ensco.

Ensco's mobile laboratory contains the following equipment:

1. Gas chromatograph with dual FID, ECD, and automatic integrator

2. Atomic Absorption Spectrophotometer with hydride generator
   Fiberglass fume hood

3. High temperature (1100°C) furnace

4. Oven

- o Those that occur within the analytical laboratory, i.e., they are the responsibility of the analytical laboratory

- o External QA activities, which can be grouped according to those specific to the sampling effort and those specific to the analytical effort.

The specific QA activities planned for the subject program can be outlined as follows:

External QA

1. Sampling-Related

   a. Sampling will be performed according to approved protocol where such is available; such protocol typically contains specific QA requirements.

   b. Sampling will be performed in a manner to produce representative samples.

2. Analytical-Related

   a. Blank samples will be included on a selected basis and submitted for analysis.

   b. Replicate samples will be taken on a selected basis and submitted for analysis.

   c. A limited number of sample splits will be taken and submitted to the on-call laboratory for analysis.

   d. All analytical data will be reviewed and validated for completeness, consistency, and accuracy.

ATTACHMENT VII

ATTACHMENT VIII

2. The equipment in the Solids Processing Unit will be triple-rinsed with kerosene before removal. Kerosene will be collected and incinerated.

8.1.2 MWP-2000 and Auxiliary Units

The MWP-2000 and its auxiliary units will be decontaminated before removal from the site. The procedures that will be used to accomplish this are delineated below.

1. The weigh hopper, feed hopper, and solids feed conveyor will be steam-cleaned and then swabbed with kerosene or diesel fuel. The ram or screw feed will be swabbed with the same type of fuel as will support structures. The steam condensate and dirty fuel will be collected and incinerated.

2. Solids will be removed from the treated receiving bin, secondary combustor, sumps in the air pollution control train, and other points in the system. They will be placed in roll-off bins and tested. Based on the test results, they will be transferred either to the incinerator if contaminated or the site if clean.

3. After all wastes and contaminated materials are incinerated, the MWP-2000 will be operated on clean fuel at full thermal loading and required thermal destruction operating conditions for at least 48 h. It will then be normally shut down.

4. Water will be removed from the treated soil receiving bin and all of the sumps in the air pollution control train and held in storage tanks. It will be tested for verification of meeting criteria for TCDD of <10 ppt, then discharged to the POTW.

5. Refractory in the system will not be removed unless required by an abnormal event. If refractory is removed from the system, it will be incinerated as a minimum in the cleanup run in 3 above.

6. The system will then be dismantled and removed from the site.

8.1.3 Residual Staging Units

The tanks, erected basins, roll-off boxes, and other containers used in these staging units will be cleaned with water and removed. Any earthen containment structures will be leveled or filled, as appropriate, and the area returned to its pre-test contours.

10. PERSONNEL QUALIFICATIONS

Key personnel involved in this project and the project structure are presented in Figure 10-1. In addition, abbreviated resumes of key personnel qualifications are provided.

H. D. Williams

Principal Program Specialist
Waste Technology Programs

Education

B.S., Chemical Engineering, University of Colorado
M.S., Nuclear Engineering, University of Idaho

Experience

Twenty-three years experience in program, project, technical, and operations management in the nuclear and aerospace industry. Developed and implemented the Hazardous Waste Management Plan and Procedures for the Space Transportation System (Shuttle) at Vandenberg AFB. Initiated hazardous waste operations at Vandenberg AFB. Chairman of the National Department of Energy (DOE) Committee for Development of Criteria and Regulations for DOE Low-Level Radioactive Waste (DOE Order 5820). Supervisor of plant operations and maintenance for three nuclear test reactors and the experiment operations for Naval Reactors Program, various universities, and other governmental agencies.

Publications

Numerous publications in hazardous waste management, nuclear waste management, nuclear reactor operation, and nuclear experimentation.

At the INEL, current assignments include the program management responsibilities of the USAF Site Demonstrations: Environmental Restoration Technologies.

W. A. Propp

Scientist
Chemical Sciences

Education

B. A., Chemistry, University of Colorado
Graduate work equivalent to a PhD., Physical Chemistry, Oregon State University

Experience

Eight years varied industrial experience in air pollution control and resources and energy recovery from municipal solid waste. Experience includes work in process engineering, analytical chemistry, process chemistry research and development, and environmental science and engineering.

At the INEL, current assignments include oversight and monitoring responsibilities for an ongoing laboratory analysis and quality assurance/quality control program supporting a USAF soil sampling and mapping program for dioxin contamination at former herbicide orange storage sites and the USAF Environmental Restoration Program for Site Demonstrations.

Publications

Publications in solid state chemistry, air pollution control chemistry, and energy recovery from municipal solid waste.

R. L. Biliau

Safety Engineer
Safety and Environmental Programs

Education

B. S., Biology, Colorado State University
M.S., Technical Education (concentrated in Industrial Engineering), Oklahoma State University

Experience

Nine years experience as a safety professional, with extensive experience in hazardous material safety. Taught several hazardous materials courses while assistant professor at a major state university. Completed extensive safety analyses on hazardous materials storage locations. Conducted emergency response training for chemical spills. Developed and taught training courses for shipment of hazardous materials. The shipping experience included extensive usage of AFR-71-4 in the associated MIL-STDs for government shipments.

A. E. Grey

Senior Scientist
Chemical Sciences

Education

B. S., Chemistry, University of Idaho
M. S., Organic Chemistry, University of Idaho
2-1/2 years, Ph.D program, Bio-Organic Chemistry, Washington State University

Experience

Seventeen years experience in the petrochemical industry in analytical, plant process, and research chemistry. Head of laboratory for analytical and process chemistry. In addition, five years experience in radioactive waste management, primarily concerned with criteria development and interpretation of environmental and nuclear laws and regulations. Responsible for three laboratories in a multidisciplinary laboratory complex.

Publications

Numerous publications in organic, organometallic, radioactive, and inorganic chemistry at university, commercial, and governmental levels. Several studies in synthesis/process control, one of which is patented.

J. E. Winchester

Instrumentation and Controls Engineer
Ensco, Inc.

Education

B. S., Electrical Engineering, Tennessee Technological University
M. S., Engineering Science, University of Tennessee

Experience

Thirteen years experience in the design of instrumentation and control systems. Experience includes the design of numerous measurement and control systems associated with combustion research and development. Configured computerized data acquisition and control systems for two mobile incineration systems that are presently operational. Conceptualized a burner management system for a four-burner waste-fired boiler system. Contributed to the implementation of a complex control scheme to modulate the injection of aqueous waste at an incineration facility. Designed measurement and control systems for research and development testing of coal-fired magnetohydrodynamic electric generators.

J. F. Martin

Engineering Manager
Ensco, Inc.

Education

B. S., Physics, University of Tennessee
M. S., Engineering Science, University of Tennessee
Registered Professional Engineer

Experience

Responsible for administrative and technical direction of a DOE/Magnetohydrodynamic coal energy conversion facility. Coordinated efforts of major architectural and engineering firms, coal combustion equipment suppliers, and DOE in design approval of systems and components. Specific project experience includes directing engineering design of oxygen enriched combustion system, thermal oxidation furnace, quench and other ancillary systems that make up a mobile hazardous waste incineration system. Developed facilities for testing and operating this system in an EPA-approved trial burn. Developed a preliminary design of a coal gasification system using an entrained bed oxygen blown gasifier. Developed designs for using dirty fuels such as coal or waste in an oxygen-enriched combustion environment. Managed design effort of high pressure, high temperature coal burner for advanced power systems, combustion chambers, coal feed systems, and high temperature slag separation cyclones. Developed design criteria for gas cleanup equipment for various combustion systems.

Publications

Several papers concerning developments in magnetohydrodynamics, high-temperature coal combustion, and related test facilities.

G. C. Combs

Vice President, Engineering
Ensco, Inc.

Education

B. S., Chemical Engineering, University of Arkansas
Ph.D., Engineering Science, University of Arkansas

Experience

Responsible for modification and maintenance of incinerator and the overall technical responsibility for operations. Responsible for technical aspects of an integrated waste disposal facility. Supervised a test burn on hexachorocyclopentadiene waste and conducted and supervised research related to drilling and production of oil and gas. Supervised design, construction, testing, and permitting of a large rotary kiln incinerator system that was permitted to incinerate solid PCB materials. Involved in the design and engineering of technical and economic evaluation of solid waste incinerators, wood-waste incinerators, hazardous waste incinerators, conceptual design and development of capital and operating budgets, evaluation of European hazardous waste incinerators to select those capable of complete destruction of high refractory compounds, and measurement of adsorption isotherms and design of charcoal filtration system. Member of the Scientific Policy Review Committee for the Arkansas Department of Pollution Control and Ecology.

The treated soil will be transferred to roll-off bins on dump trucks. The treated soil will be held in batches in each bin, pending verification of meeting criteria as defined in Appendix A, Sampling and Analysis Matrix. When verification has been completed, the soil will be reloaded and transported via a designated clean route to a verified clean spot for placement back on the HO site.

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R. Lipscomb

Ensco, Inc.

Education

B. S., Chemical Engineering, University of Tennessee

Experience

Responsible for supervision of the installation, startup, and operation on job sites. Oversees the development and implementation of the health and safety program and the quality control program. Supervised electrical, mechanical, and instrumentation engineers in the design of automatic control systems including energy management, boilers, bulk weighing/handling, drilling machines, winding machines, and assembly plant transfer systems. Responsible for projects such as an electric-arc phosphorus furnace plant from cost estimating to startup. Projects included waste incineration in a rotary kiln, rock crushing/screening, plant expansion, and boiler controls.

Provided technical feasibility studies, cost estimates, and profitability analyses for specialty chemical products. Worked in the development of a computer model of a distillation plant. Supervised the fabrication and instillation of replacement tower trays and heat exchangers necessitated by severe corrosion while developing new process procedures, alloys, cladding techniques to prevent future corrosion.

APPENDIX A
SAMPLING AND ANALYSIS MATRIX

APPENDIX A

SAMPLING AND ANALYSIS MATRIX

Table A-1 presents the Criteria List that will determine the sampling and analysis requirements for this RD&D project. Individual constituents were identified through evaluation of existing data of NCBC soil and comparison with the Appendix VIII constituents in 40 CFR Part 261. EPA Headquarters has reviewed and commented on the constituents.

The goal of this demonstration is to reduce the TCDD concentrations in the soil at the HO site to ≤1 ppb and the total chlorinated dibenzodioxins and dibenzofurans to <1 ppb. Therefore, the treated soil and excavated holes will be sampled and analyzed throughout the demonstration to meet these goals.

In addition, a test run will be conducted before full operation to allow sampling and analysis of the treated soil to ensure that the remaining criteria in Table A-1 are met.

A requirement for issuance of the sampling and analysis subcontracts is that EPA sampling protocol and analytical methods be adhered to. Additional details of sampling and analysis will be available following award of subcontracts.

TABLE A-1. SAMPLING AND ANALYSIS MATRIX

Criteria List

Constituent	Analytical Method	Criteria/ Detection Limit[a]
	Parameters for Routine Sampling	
Total chlorinated dibenzo-dioxins and dibenzofurans (CDDs and CDFs)	8280	<1 ppb
2,3,7,8-TCDD	8280	≤1 ppb
	Parameters for Test Run	
Metals		
Antimony	SW846-7040	1 ppm
Arsenic	EP Toxicity	5 ppm
Barium	EP Toxicity	100 ppm
Beryllium	SW846-7090	1 ppm
Cadmium	EP Toxicity	1 ppm
Chromium	EP Toxicity	5 ppm
Copper	SW846-7210	1 ppm
Lead	EP Toxicity	5 ppm
Mercury	EP Toxicity	0.2 ppm
Nickel	SW846-7520	1 ppm
Selenium	EP Toxicity	1 ppm
Silver	EP Toxicity	5 ppm
Thallium	SW846-7840	1 ppm
Zinc	SW846-7950	1 ppm
	Appendix VIII Constituents	
Benzo[b]fluoranthene (2,3-Benzofluoranthene)	SW846-8250 SW846-8310	4.800 ppb 0.018 ppb
Benzo[a]pyrene (3,4-Benzopyrene)	SW846-8100 SW846-8250 SW846-8310 8310	NG[b] 2.500 ppb 0.013 ppb 0.013 ppb
Chlorinated benzenes [EPA comment: use methods for individual benzenes][c]		
Chlorinated phenol [EPA comment: use methods for individual phenols][c]		

APPENDIX D

STACK GAS MONITORING SYSTEM

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The stack gas monitoring system consists of an extraction and conditioning system that feeds the conditioned stack gas to continuous monitors. These dedicated instruments continuously analyze the conditioned gas for carbon monoxide, carbon dioxide, oxygen, hydrocarbons, and nitrogen oxides. The analytical results are continuously monitored by the data acquisition and control system and can be used by the computer to effect automatic waste feed shutdown when abnormal conditions occur. Additionally, the readings from the oxygen and carbon monoxide monitors are continuously recorded by strip chart recorders.

The stack gas sampling probe is located at a point greater than 8 stack diameters downstream of the last bend and 2 stack diameters upstream of the stack exit. This stainless steel probe has a thermocouple reading the temperature of the extracted sample. A coarse particulate filter removes some of the water droplets and larger particulates before the sample enters the conditioning system. A calibration gas port is at the exterior of the probe to ensure system integrity. A diaphragm pump with Teflon seals provides the prime mover of the gas sample to the analyzers. This is done to keep the sample under a positive pressure so that any leaks that may develop will not affect the readings of the monitors.

The gas sample is pushed from the pump through an air-cooled Teflon tube of about 10 ft long to allow the gas to begin cooling and condense the entrained moisture. The gas sample then passes through a chilled condenser to remove the condensable moisture from the gas. This condenser consists of a 20-ft-long stainless steel tubing with a chilled water jacket. The cooling water is recirculated through a chiller thermostated at 37°F. The sample then passes through a water trap to remove the condensate. This trap has a float-operated drain to automatically expel the condensate under positive pressure. The condensate free gas then goes through a fine particulate filter followed by a permeation type dryer.

The carbon dioxide content of the stack gas is continuously monitored by an Infrared Industries IR-703 carbon dioxide analyzer. This analyzer is a dual-beam, nondispersive infrared analyzer designed for the measurement of carbon dioxide. This system compares the infrared transmittance of two identical optical paths, one through the sample gas and the other through the reference path. The difference in optical transmittance between these paths then is a measure of the optical absorption due to the concentration of the carbon dioxide. Circuitry processes the nonlinear output signal and linearizes it to provide a linear output signal. This instrument has two ranges available: 0-5 and 0-50% carbon dioxide. The monitor has a 4-20 milliamp output, which is relayed through a shielded pair wire to the computer for data handling and storage. The sensitivity of this instrument is 0.5% of full scale, and accuracy is ±1% of full scale.

The carbon monoxide content of the stack gas is continuously monitored by a Horiba PIR-2000 carbon monoxide analyzer. This analyzer operates on the nondispersive infrared absorption principle. Twin beams of infrared radiation are projected through parallel cells. One beam traverses the sample cell; the other beam, the comparison cell. Carbon monoxide absorbs (and reduces) the radiation reaching the detector via the sample beam. The detector converts this into an electrical signal proportional to the concentration of the carbon monoxide. This instrument has a linear 4-20 milliamp output over the range 0-500 ppm of carbon monoxide. The output is relayed through a shielded pair wire to the computer for data handling and storage, as well as to an independent strip chart recorder. The sensitivity of this instrument is 1% of full scale, and accuracy is ±2% of full scale.

The hydrocarbon content of the stack gas is continuously monitored by an hnu Model 1201 hydrocarbon analyzer. This analyzer operates on the detection principle of photoionization. The sensor consists of a sealed ultraviolet light source that emits photons that are energetic enough to ionize many organic species, but not the major components of air. A chamber adjacent to the ultraviolet source contains a pair of electrodes. When a positive potential is applied to one electrode, the field created continuous monitors as if it were stack gas. The controls to regulate this calibration gas are contained within the control room to allow flagging of the data as it is stored by the computer system.

Each monitor undergoes a four-point calibration cycle at least once a week, or more often if the daily checks indicate the need. These four points consist of a zero gas, full scale within 25%, half of full scale ±25%, and one point within 25% of the normal reading of the instrument during the incineration of the waste, based on historical data. At least once a day, the zero and full-scale calibration gases are used to check the response of each analyzer. The zero gas is typically pure nitrogen, although the calibration gas for another analyzer may be used if the gas is free of any impurities that might have an effect. For economy and ease of operation, the calibration gases for CO, CO_2, and O_2 are combined since these are not mutually reactive, only limited by the partial pressure of the CO_2 gas. The calibration gases from NO_x for hydrocarbons are stored separately from the others.

The data from the daily and weekly checks are recorded automatically by the computer for the readings from the monitors. Additionally, a separate calibration record is maintained. The instruments are not adjusted during the daily checks, but the data are recorded to attempt to determine any drift or other variation that may occur. The instruments are only adjusted during the full four-point calibration cycle. All calibration and daily checks are examined every 2 to 4 weeks to attempt to identify any maintenance or operational problems that may be occurring. Whenever these are identified, they are added to the manufacturer's recommendations for that analyzer during the course of that particualr cleanup, unless they are identified as being a continuing problem. During the weekly four-point calibration cycle, all filters and traps throughout the sampling system are examined and replaced or cleaned as necessary.