



US Army Corps
of Engineers ®

EIRS Bulletin

Engineering Improvement Recommendation System

No. 97-02

Date: 28 February 1997

The Engineering Improvement Recommendation System Bulletin is part of our Information Feedback System and is used in military construction programs to expedite dissemination of information regarding problems. The probable solutions included in the EIRS BULLETIN have not been thoroughly explored or staffed. Accordingly, these probable solutions do not represent a final HQUSACE position, and their use is not mandatory. Probable solutions are considered as informational in nature for the purpose of permitting prompt consideration by the field. EIRS Bulletin recipients are encouraged to comment on the probable solutions presented so that other viewpoints can be considered in the development of the final HQUSACE position. Since changes to criteria approved by ENG Form 3078, Recommended Changes to Engineering Documents, are expected to remain firm, they are identified as final solutions and should be used in current design. To defray printing costs, local reproduction of this bulletin is authorized. This issue of the EIRS Bulletin contains 5 enclosures as follows:

ENCL 1: ENGINEERING AND DESIGN - Vehicle Exhaust Duct

ENCL 2: ENGINEERING AND DESIGN - Roofing

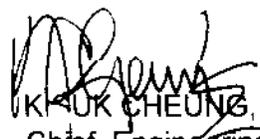
ENCL 3: ENGINEERING AND DESIGN - Telephone Cable in Family Housing

ENCL 4: RECOMMENDED CHANGES TO ENGINEERING DOCUMENTS - ENG Form 3078 Follow-up Actions

ENCL 5: ENGINEERING AND DESIGN - CURRENT DESIGN CRITERIA - Recently Issued Criteria

FOR THE COMMANDER:

5 Encls


KINUK CHEUNG, P.E.
Chief, Engineering Division
Directorate of Military Programs

ENGINEERING AND DESIGN

Vehicle Exhaust Duct:

a. Problem: In most instances, the design for a vehicle exhaust system is a standard approach referenced from the Industrial Ventilation Manual as directed by the CEGS-15940, Overhead Vehicle Tailpipe (and Welding Fume) Exhaust System. Normally, the exhaust ductwork is routed directly outside which is desirable due to the toxic gases. When this direct routing is not possible due to existing construction or another restriction, this ductwork may have to extend into the administrative or other non-vehicle repair spaces before exiting the building. The problem is that the current Industrial Ventilation Manual does not address this design situation and the engineer has no guideline to follow.

b. Probable Solution: Vehicle exhaust gas leakage at any level is undesirable. Hot gases ducted through building spaces also have the potential to form condensate. To avoid both of these problems, the designer should properly address two concerns in addition to adhering to the garage ventilation requirements of the Industrial Ventilation Manual.

(1) The exhaust ductwork must be appropriately sealed. Standard joint sealer will deteriorate over time and exposure to vehicle exhaust gases accelerates this material breakdown. To eliminate all gas leakage, duct joints must be soldered air tight.

(2) A second concern is maintaining a negative pressure in the exhaust ductwork. The fan should be installed outside the building with the fan discharge entirely external to the structure. When this is done, no positive pressure ductwork would be placed inside the building avoiding the potential of exhaust leakage into building spaces. An additional advantage to this outside location is that the flexible joint at the fan outlet is also installed exterior to the building. The flexible joint can be a source of leakage if the joint is not properly installed or exhaust gases cause the flexible material to deteriorate. Finally, a correctly sized fan both in terms of volume flow and static pressure will assure a negative pressure along the entire exhaust duct length.

(3) These design guidelines are the best recommendations at this time. The routing of exhaust ductwork through vehicle repair building administration space is being addressed to personnel who publish the Industrial Ventilation Manual.

Encl 1

ENGINEERING AND DESIGN

Roofing:

a. Problem: Roofs on USACE constructed projects are failing at an alarming rate. They do not live up to their warranty expectations, and actual life is considerably below designed life. Customer's expecting twenty years of useful life are plagued with problems from inception, and are re-roofing in far shorter periods of time than warranties indicate should be necessary.

b. Probable Solution: USACE has started work on a comprehensive program to improve roofing quality through the development of design instructions, Corps of Engineers Guide Specification (CEGS) revisions, improved training for designers and Quality Control/Quality Assurance (QC/QA) personnel, and improvement in design and construction processes, as well as facilitating better maintenance procedures. The purpose of this bulletin is to highlight areas where immediate action can be taken to reduce roofing problems.

(1) Choose roofing systems appropriate to the building and weather conditions. Avoid complex profiles which are difficult to waterproof, design, construct, and maintain. Minimize penetrations.

(2) Detail ridges, valleys, eaves, parapet walls, transitions in slope or material, special conditions, and penetrations. Providing for roof expansion and contraction is particularly important. The fourth edition of the National Roofing Contractors' Association (NRCA) Roofing and Waterproofing Manual provides excellent practical application guidance. Design details must show the relationship of the roofing system to roof decking and insulation as well as flashing materials and the building structure. This is the designer's responsibility.

(3) In specifications, require all parts of standing seam metal roofing systems to be of a single supplier. Require that the manufacturer draw and certify the shop drawings for this system. Require the roofing designer to review the shop drawings to assure the intent of the project design is maintained. Require that the installer show proof of certification as a trained installer of the system provided.

(4) QA/QC. Require that the manufacturer's representative and the USACE quality assurance person be on-site or readily available while the roof system is being applied. Test all roof systems for leakage and correct in the manufacturer's recommended manner.

Encl 2 (2 pages)

c. Implementation: The implementation of this policy is considered to have ***special application*** as defined by ER 1110-345-100.

d. Additional Information: For additional information concerning the following component subjects contact the following persons:

(1) Standing Seam Metal Roofing Systems. Contact Mr. Ray Navidi, CEMP-ET, telephone (202) 761-0223 or DSN 763-0223, telecopier (202) 761-4139, email ray.navidi@inet.hq.usace.army.mil.

(2) Architectural Roofing Systems. Contact Mr. Frank A. Norcross, CEMP-EA, telephone (202) 761-0881 or DSN 763-0881, telecopier (202) 761-8815, email frank.norcross@inet.hq.usace.army.mil.

(3) QA/QC Issues. Contact Mr. John Reiley, CEMP-CE, telephone (202) 761-0204 or DSN 763-0204, telecopier (202) 761-4797, email john.reiley@inet.hq.usace.army.mil.

ENGINEERING AND DESIGN

Telephone Cable in Family Housing:

a. Problem: DAIM-FDR Memorandum for See Distribution, Subject: Policy on Communication Wiring for Army Family Housing Construction, 16 December 1996, DA requires Category 3 cable in family housing. Information Systems Engineering Command requested that Category 5 cable be used everywhere, including family housing, because the cost difference is small. Category 5 cable will handle direct connections to base-wide local area networks when they are brought to housing areas. It will also provide better performance if the occupants go to ISDN service. The cost differential is \$2.62 more per outlet for Category 5 versus Category 3, or \$13 for a three bedroom family housing unit.

b. Probable Solution: Architectural and Engineering Instructions, Army Family Housing, 1 November 1996, Volume 2, Statement of Work, Paragraph 9.i. should be revised as follows:

i. Telephone. Pre-wire housing units in accordance with local telephone company requirements. Provide outlets in kitchen, dining, or family area, living room and all bedrooms of each housing unit. ~~Standard~~ Eight position modular jack connectors shall be provided at all outlets. The ~~plugs~~ jacks provided in the kitchen, dining, or family areas shall be for a wall-mounted phone. ~~Wiring and modular jacks~~ methods shall comply with EIA/TIA Standard 570, Residential and Light Commercial Telecommunications Wiring Standard. Cable and jacks shall be Category 5 per TIA/EIA 568A, Commercial Building Telecommunications Cabling Standard.

c. Implementation: The implementation of this policy is considered to have **special application** as defined by ER 1110-345-100.

d. Additional Information: For additional information concerning family housing criteria contact Mr. Frank A. Norcross, CFMP-FA, telephone (202) 761-0881 or DSN 763-0881, telecopier (202) 761-8815, email frank.norcross@inet.hq.usace.army.mil. For additional clarification of the family housing wiring issue described above please contact Mr. Robert Fite, CEMP-ET, telephone (202) 761-8626.

Encl 3

RECOMMENDED CHANGES TO ENGINEERING DOCUMENTS

ENG Form 3078 Follow-up Actions:

a. Problem: ENG Forms 3078 which indicate an affirmative action by HQUSACE are provided to the originating USACE Commands. Since the ENG Forms 3078 will result in changes to the criteria and guidance, all USACE Commands should receive the same information to be used in criteria designs.

b. Probable Solution: Reviewed ENG Forms 3078 which make a commitment to change guide specifications, manuals, etc. will be included in the EIRS Bulletin, unless the change has been accomplished. This enclosure includes a copy of ENG Form 3078.

Encl 4 (9 pages)

ENG FORMS 3078

<u>CONTROL NO.</u>	<u>PUB NO.</u>	<u>OFFICE SYMBOL</u>
9065	CEGS-15895	CENAN-EN
9069	CEGS-Div 15 Specs	CESWF-ED-CS

RECOMMENDED CHANGES TO ENGINEERING DOCUMENTS <i>(Submit a separate form in quadruplicate for each report)</i> (ER 1110-345-100)		OFFICE SYMBOL AND DATE CENAN-EN 16 Dec 96
DOCUMENT NUMBER AND DATE CECS 15895	DOCUMENT TITLE Air Supply, Distribution, Ventilation and Exhaust Systems	
DOCUMENT TYPE <input type="checkbox"/> DRAWING (STANDARD) (DEFINITIVE) <input checked="" type="checkbox"/> SPECIFICATION (GUIDE) (STANDARD) <input type="checkbox"/> DESIGN GUIDES <input type="checkbox"/> TECHNICAL MANUAL <input type="checkbox"/> ENGINEER MANUAL <input type="checkbox"/> ENGINEER REGULATION <input type="checkbox"/> OTHER		<input checked="" type="checkbox"/> MILITARY <input type="checkbox"/> CIVIL WORKS
SUBJECT		
ROUTING (Check) FROM District Commander U.S. Army Engineer District. Attn: CENAN-EN-DB		ACTION RECOMMENDED BY DISTRICT COMMANDER <i>(See Sheet 2)</i>
		OFFICE SYMBOL: CENAN-EN NAME AND TITLE (Print or Type): Arthur J. Connolly P.F. Chief, Engineering Division DATE: SIGNATURE: <i>Arthur J. Connolly</i>
<input type="checkbox"/> TO: HQUSACE (CEMP EA) WASH DC 20314-1000		INFORMATION COPY OF THIS ENG FORM 3074 WAS SENT _____ Date:
<input type="checkbox"/> TO: Division Commander U.S. Army Engineer Division Attn: John Kerkowski CENAD-ET-ET		COMMENTS, ACTION OR RECOMMENDATION BY DIVISION COMMANDER Refer to CENAD-ET-ET note on sheet 2 regarding DCE visit in May 96 Recommend Approval OFFICE SYMBOL: CENAD-ET-ET NAME AND TITLE (Print or Type): John Sassi P.F. Director, CENAD-ET DATE: 10 Jan 97 SIGNATURE: <i>John Sassi</i>
<input type="checkbox"/> TO: HQUSACE (CEMP EA) WASH DC 20314-1000		COMMENTS OR ACTION BY COMMANDER, USACE Approved. See attached sheet. OFFICE SYMBOL: CEMP-E NAME AND TITLE (Print or Type): KISUK CHIEUNG, P.E.C, ENGR. DIV., DIV., D/MP DATE: SIGNATURE:
<input type="checkbox"/> TO: Division Commander U.S. Army Engineer Division.		COMMENTS BY DIVISION COMMANDER OFFICE SYMBOL: NAME AND TITLE (Print or Type): DATE: SIGNATURE:
<input type="checkbox"/> RETURN TO: District Commander U.S. Army Engineer District.		COPY FURNISHED

RECOMMENDED CHANGES TO ENGINEERING DOCUMENTS (Cont'd)

OFFICE SYMBOL AND DATE

CENAN-EN

16 December 96

PROBLEM DESCRIPTION AND ACTION RECOMMENDED (Use additional sheets if necessary.)

1. PROBLEM:

There is currently no manufacturer or Corps criteria directing the installation of auxiliary drain pans in refrigeration or air conditioning systems at the cooling coils to catch condensate "spillover". Aux. drain pans have been included in Corps design via "good design practice" from our Corps designers, but there is no criteria in place (i.e. guide specs, TMS, EIRs, etc.) to standardize the installation for reasons other than designer choice. Therefore the CECS 15895 "Air Supply, Distribution, Ventilation, and Exhaust Systems" specification paragraph 2.11.1.4 should be upgraded to include a statement to include auxiliary drain pans for the purpose of coil condensate "spillover" removal.

CENAD-ET-ET Note: During a Design Construction Evaluation visit to NY District in May 96, the OCE team generated observation card #17 from RPT # 96044. This recommendation is a take-off to this observation card. Darryl Lowery, Mechanical Engineer, 212 264-7114

2. RECOMMENDED SOLUTION

The specification paragraph currently reads:

2.11.1.4 Drain Pans

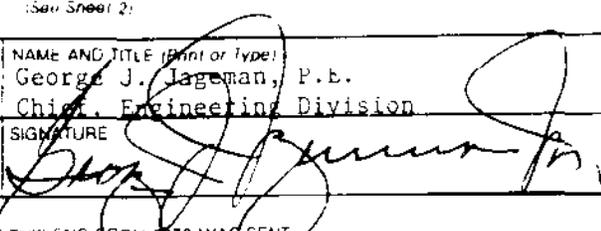
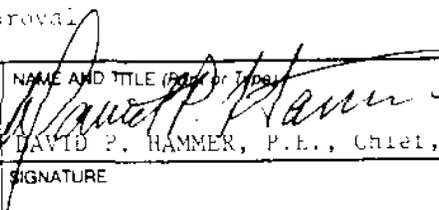
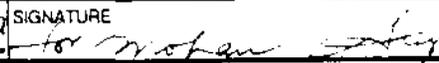
Drain and drip pans shall be sized and located to collect all water condensed on and dripping from any item within the unit enclosure or casing. Drain pans shall be constructed of not lighter than 0.9 mm (21 gauge) (21 gauge) steel, galvanized after fabrication, thermally insulated to prevent condensation. Insulation shall have a flame spread rating not over 25 without evidence of continued progressive combustion, a smoke developed rating no higher than 50, and shall be of a waterproof type or coated with a waterproofing material. In lieu of the above, drain pans may be constructed of die-formed 0.85 mm (22 gauge) (22 gauge) steel, formed from a single sheet, galvanized after fabrication, insulated and coated as specified for the 0.9 mm (21 gauge) (21 gauge) material or of die-formed 0.9 mm (21 gauge) (21 gauge) type 304 stainless steel, insulated as specified above. Drain pans shall be pitched to drain. Minimum 20 mm (3/4 inch) (3/4 inch) NPT or 25 mm (5/8 inch) (5/8 inch) OD drain connection shall be provided in drain pan. Auxiliary drain pans to catch drips from control and piping packages, eliminating insulation of the packages, may be plastic; if metal, the auxiliary pans shall comply with the requirements specified above. Insulation at control and piping connections thereto shall extend 25 mm (1 inch) minimum over the auxiliary drain pan.

Add the following note:

Note: The intent of this paragraph is to assure that there will be auxiliary drain pans included during installation of equipment which is expected to condense water during normal operation. This equipment is usually contained in drop or hung ceiling applications. The auxiliary pan drain

Response to 3078 submitted 16 December 1996

High humidity areas can have a condensate overflow problem much more often than dryer locations of the country if the drain and drip pans are not sized correctly. A paragraph in CEGS 15895 does address the sizing of the drain pans but a designer's note is needed to require the designer, especially in high humidity regions, to determine the size of the drain pan needed. The designer can then prevent any overflow problem from occurring by coordinating with the manufacturer and/or providing the proper note(s) on the construction plans. These note(s) will then alert the submittal reviewer to be certain drain pan size is adequate and no overflow will occur. A designer's note will be added to the CEGS 15895 in the near future under the Notice Program addressing this point.

RECOMMENDED CHANGES TO ENGINEERING DOCUMENTS <i>(Submit a separate form in quadruplicate for each report)</i> <small>(ER 1110-143-1001)</small>		OFFICE SYMBOL AND DATE
DOCUMENT NUMBER AND DATE CEGS DOCUMENT TYPE	DOCUMENT TITLE All Division 15 Specifications	CEORL-ED 6 Nov 96
<input type="checkbox"/> DRAWING ([STANDARD]; [DEFINITIVE]) <input checked="" type="checkbox"/> SPECIFICATION ([GUIDE]; [STANDARD]) <input type="checkbox"/> DESIGN GUIDES <input type="checkbox"/> TECHNICAL MANUAL <input type="checkbox"/> ENGINEER MANUAL <input type="checkbox"/> ENGINEER REGULATION <input type="checkbox"/> OTHER		<input checked="" type="checkbox"/> MILITARY <input type="checkbox"/> CIVIL WORKS
SUBJECT Manufacturer's Installation Instructions		
ROUTING (Check)		ACTION RECOMMENDED BY DISTRICT COMMANDER
FROM District Commander U.S. Army Engineer District P. O. Box 59 Louisville KY 40201-0059		(See Sheet 2)
		OFFICE SYMBOL CEORL-ED
		NAME AND TITLE (Print or Type) George J. Jageman, P.E. Chief, Engineering Division
		DATE 11/20/96
		SIGNATURE 
1a TO HQUSACE (CEMP-EA) WASH DC 20314-1000	INFORMATION COPY OF THIS ENG FORM 1078 WAS SENT _____ (Date)	
1b TO Division Commander U.S. Army Engineer Division OHIO RIVER P.O. BOX 1159 500 MAIN STREET CINCINNATI OH 45201-1159	COMMENTS ACTION OR RECOMMENDATION BY DIVISION COMMANDER Recommend approval	
		OFFICE SYMBOL CEORL-ED
		NAME AND TITLE (Print or Type) DAVID P. HAMMER, P.E., Chief, Engineering Division
		DATE 1/10/97
		SIGNATURE 
2 TO HQUSACE (CEMP-EA) WASH DC 20314-1000	COMMENTS OR ACTION BY COMMANDER, USACE Concur, new requirements for manufacturer's installation instruction will be added where appropriate.	
		OFFICE SYMBOL CEMP-E
		NAME AND TITLE (Print or Type) KISUK CHEUNG, P.E., C, ENGR. DIV. D/MP
		DATE 2/16/96
		SIGNATURE 
3 TO Division Commander U.S. Army Engineer Division	COMMENTS BY DIVISION COMMANDER	
		OFFICE SYMBOL
		NAME AND TITLE (Print or Type)
		DATE
		SIGNATURE
4 RETURN TO District Commander U.S. Army Engineer District	COPY FURNISHED	

RECOMMENDED CHANGES TO ENGINEERING DOCUMENTS (Cont'd)

OFFICE SYMBOL AND DATE

CEORL-ED

PROBLEM DESCRIPTION AND ACTION RECOMMENDED (Use additional sheets if necessary)

1 PROBLEM

Manufacturer's installation instructions are often not available for reference at the job site, nor at the Government or Contractor's field office. This information is typically not included with the submittal data, so the Government usually does not have a copy of this important information. The information sometimes arrives as a single copy taped to a piece of equipment. This lone copy is often misplaced and is not available for reference by the Government or by the installing subcontractor. When questions arise concerning the proper method of installation, no one has a copy of the manufacturer's installation instructions.

The problem is in part caused by the way the submittal requirements are written in the Guide Specifications. In Division 15, about half of the specification sections do not require manufacturer instructions to be submitted. The other half of the sections do require this information. The requirement is under subheadings to SD-01 Data, or SD-04 Drawings. The problem is that the subheading is called something other than "Manufacturer's Installation Instructions." As a result, manufacturer's installation instructions do not appear as a line item on the submittal register and are often overlooked until there is a problem.

2 RECOMMENDED SOLUTION

According to the Definition of Submittals found in Note C at the end of CEGS-01300, the proper location for manufacturer's installation instructions would be under SD-06 Instructions, or possibly SD-01 Data. Under either SD-06 or SD-01, the information should be listed as a separate subheading called "Manufacturer's Installation Instructions; FIO." The word processing program used to edit the specifications contains macros which will then list this information as an item in the submittal register.

In the submittal paragraphs of all specification sections requiring equipment or products, under either SD-06 Instructions or SD-01 Data, provide a separate subheading called "Manufacturer's Installation Instructions; FIO." In the description under this subheading, require manufacturer's installation procedures and instructions including diagrams and precautions required to properly install, adjust, calibrate, and test the products or equipment.

(Two examples follow)

SECTION C-15569
WATER AND STEAM HEATING; OIL, GAS OR BOTH; UP TO 20 MBTUH
05/95

(Excerpts)

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "PIO" designation are for information only. The following shall be submitted in accordance with Section C-01300 SUBMITTAL PROCEDURES:

SD-01 Data (no changes here)

SD-04 Drawings (no changes here)

SD-06 Instructions

Manufacturer's Installation Instructions; FIO

Submit manufacturer's installation procedures and instructions including diagrams and precautions required to properly install, adjust, calibrate, and test the products or equipment.

Posted Instructions; GA

System layout diagrams that show the layout of equipment, piping, and ductwork and typed condensed operation manuals explaining preventative maintenance procedures, methods of checking the system for normal, safe operation, and procedures for safely starting and stopping the system, framed under glass or laminated plastic, at least 2 weeks prior to the start of related testing. After approval, these items shall be posted where directed.

SD-07 Schedules (no changes here)

SD-09 Reports (no changes here)

SD-13 Certificates (no changes here)

SD-19 Operation and Maintenance Manuals (no changes here)

(End of example for 15569)

SECTION C-15653
AIR-CONDITIONING SYSTEM UNITARY TYPE;
09/93

(excerpts)

1.0 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section C-01300 SUBMITTAL PROCEDURES:

SD-01 Data

Air-Conditioning/Heat Pump System; \pm _____ \pm

Manufacturer's standard catalog data, prior to the purchase or installation of a particular component, shall be highlighted to show brand name, model number, size, options, performance charts and curves, etc. in sufficient detail to demonstrate compliance with contract requirements. Data shall be submitted for each specified component. ~~Data shall include manufacturer's recommended installation instructions and procedures.~~ If vibration isolation is specified for a unit, vibration isolator literature shall be included containing catalog cuts and certification that the isolation characteristics of the isolators provided meet the manufacturer's recommendations.

Water Treatment Systems; GA.

~~Six~~ \pm _____ \pm complete copies of the proposed water treatment plan including a layout, control scheme, a list of existing make-up water conditions, a list of the types and proportions of chemicals used, the final treated water conditions, and a description of all environmental concerns for handling the chemicals.

Spare Parts Data; \pm _____ \pm .

Spare parts data for each different item of equipment specified, after approval of detail drawings and not later than \pm _____ \pm months prior to the date of beneficial occupancy. The data shall include a complete list of parts and supplies, with current unit prices and source of supply, a recommended spare parts list for 1 year of operation, and a list of the parts recommended by the manufacturer to be replaced on a routine basis.

SD-04 Drawings (no changes here)

SD-06 Instructions

Manufacturer's Installation Instructions; FIO

Submit manufacturer's installation procedures and instructions including diagrams and precautions required to properly install, adjust, calibrate, and test the products or equipment.

Framed Instructions; FIO.

Framed instructions for posting, at least 2 weeks prior to construction completion.

SD-07 Schedules (no changes here)

SD-08 Statements (no changes here)

SD-09 Reports (no changes here)

SD-13 Certificates (no changes here)

SD-19 Operation and Maintenance Manuals (no changes here)

(End of example for 15653)

CURRENT DESIGN CRITERIA

Recently Issued Criteria:

a. Problem: There have been instances where current design criteria were not used in project designs because recently issued Engineering and Design documents were placed in a central office file and were not distributed to design personnel who need to be aware of the current criteria and guidance.

b. Probable Solution: From all reports, EIRS Bulletins are widely circulated within the Engineering Division of USACE Commands and are readily accessible to all engineering and design personnel. This enclosure includes a listing of recently issued criteria.

Engineering and Design criteria for Civil Works and Military Programs are distributed by the "Construction Criteria Base (CCB)" System, National Institute of Building Sciences NIBS. CCB is available in CD-ROM format and is on the CCB web site at "<http://www.nibs.org/ccb>". Information about subscribing to CCB may be obtained by calling NIBS at (202) 289-7800. Current Military Programs Engineering and Design criteria are also available on our TECHINFO web site at "<http://w2.hnd.usace.army.mil>". For further information on TECHINFO, call the Huntsville Engineering and Support Center, CEHNC-ED-ES-G, at (205) 895-1821 between 8:00 a.m. and 4:00 p.m., Central Time.

Encl 5 (2 pages)

PUBLICATION LIST

<u>PUB-NO.</u>	<u>PUBLICATION</u>	<u>PUB-DATE</u>
CEGS-02288	Remediation of Contaminated Soils & Sludges by Incineration	Jan 97
CEGS-02889	Thermal Desorption	Jan 97
CEGS-01500	Temporary Construction Facilities	Feb 97