TEMPORARY CHANGE REQUEST

TCR NO. TCR-ENG-028,R1-002

The Temporary Change Request (TCR) Form is to be used to process urgent or minor changes for PPPL Policies, Organization/Mission Statements and Procedures. The TCR should be used when changes are:
1) urgent, and can not wait the 2-4 week period for Department Head review/comment, or
2) minor, and do not warrant Department Head review.

Person Requesting Change: Larry Dudek

Department Name: Engineering and Technical Infra. **Phone Ext:**

Document Number ENG-028 **Revision No.:** 1

Document Title Core Boring, Cutting and Drilling

Reason for change:
To clarify when this procedure is applicable.

Change description: (Summarize and attach changed pages, with changes clearly indicated)

Page 1 in the Introduction:
Removed:

- The boring, drilling or cutting of penetrations less than **3** inches deep does not require any special reviews, precautions or written procedure.

Replaced with:
The boring, drilling or cutting of penetrations in non-fire walls or floors under the following conditions is not covered by this procedure:

a. The boring, drilling or cutting of penetrations in poured concrete floors or walls less than **3** inches deep
b. Penetrations in sheet rock walls, where the penetrations do not disturb the structural members
c. Manually chiseled penetrations in hollow core concrete block walls that remove up to one (1) block.

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1. Does this TCR significantly alter the intent or scope of the document? **YES:**____ **NO:** X

2. Does this TCR significantly impact **ES&H**? **YES:**____ **NO:** X

If 1 or 2 is **YES**, Explain why the changes should not be routed for Department Head review:

Mike William (signature on file) 3/10/04
Department/Division Head Approval **Date**

J.W. Anderson (signature on file) 3/16/04
Head, ES&H and Infrastructure Support/designee **Date**

Release/Effective date of this TCR: **March 16, 2004**

Incorporate this TCR into next revision of this document? **Yes** X **No**_____

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Subject: **Core Boring, Cutting and Drilling**		**Effective Date:** **July 30, 2002**	**Initiated by:** Head, Engineering and Technical Infrastructure
		Supersedes: Revision 0, dated 9/25/98	**Approved:** Director

Applicability

This procedure applies to all activities at C and D-Sites of the Laboratory involving the boring, cutting or drilling of new or modified partial or full-through penetrations of 3 inches or deeper.

Activities that involve installation or repair of a fire seal must also follow procedure ENG-027; and, since a new penetration constitutes a Fire Barrier breach, ESU must be notified for a permit per procedure ENG-025.

Introduction

The purpose of this procedure is to establish requirements for the boring, drilling or cutting of penetrations in walls, floors and ceilings at PPPL.

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- ~~The boring, drilling or cutting of penetrations less than 3 inches deep does not require any special reviews, precautions or written procedure.~~ The boring, drilling or cutting of penetrations in non-fire walls or floors under he following conditions is not covered by this procedure.
  a. The boring, drilling or cutting of penetrations in poured concrete floors or walls less than 3 inches deep
  b. Penetrations in sheet rock walls, where the penetrations do not disturb the structural members.
  c. Manually chiseled penetrations in hollow core concrete block walls that remove up to one (1) block.
- The boring, drilling or cutting of all other penetrations must adhere to the requirements laid out in this procedure.

The following are attachments to this procedure that will guide the process for boring, cutting or drilling:

1) Requirements, Prerequisites & Precautions

2) Core Boring and Drilling Permit - *issued for each individual new penetration along with a new penetration number.*

3) Core Boring and Drilling Field Procedure - *will accompany the group of penetrations for the given job and contains important safety and job related sign-offs that must be fulfilled by PPPL and/or outside contractors.*

4) Subcontractor Statement of Work for New D-Site and C-Site Core Boring Operations - *issued as part of a requisition for an outside core bore subcontractor. Subcontractors must also follow and complete the requirements of attachments 1, 2, and 3.*

Definitions

Installer - The person(s) performing construction & installation operations are referred to as the "Installer" in this procedure. This may be an outside contractor or a PPPL technician

Penetration Engineer - The designated engineer that maintains the database of penetration numbers, inspects and approves new penetrations and specifies penetration fire seal designs.

Design Engineer – The individual responsible for the system or item that passes through the new penetration or that requires a physical modification to a penetration. Manages approvals and documentation for the particular job and assures installer compliance with this procedure.

References

PPPL Environment, Safety and Health Manual (ESHD 5008) (requires compliance with OSHA)
ENG-025 Fire Seals, Fire Dampers and Fire Doors
ENG-027 Fire Barrier Penetration Seal Installation and Repair

PROCEDURE

Responsibility	Action
Design Engineer	1. Contacts the Penetration Engineer to discuss the penetration location and general requirements.
	2. Generates drawing or sketch showing location and size of penetration. Assistance from the Penetration Engineer or from Drafting may be required to identify the proper drawings.
	3. Marks the penetration locations and numbers on the floor and walls of the building itself prior to the start of any pre-job surveys. [Numbers are assigned by the Penetration Engineer.]
Penetration Engineer	4. Reviews the facility drawings for any structural implications and evaluates structural issues related to the penetration. Identifies need for a review of embedded conduits and other electrical issues. Works with AC power to identify embedded electrical items in penetration area.
	5. Issues new Penetration Number(s) and a Core Boring and Drilling Permit (Attachment 2) and updates penetration database.
	6. Informs Design Engineer to prepare a statement of work (Attachment 4) and requisition if an outside subcontractor will be performing the boring, cutting or drilling.
	7. Informs Design Engineer to issue a written procedure (Attachment 3) incorporating the requirements, prerequisites and precautions of Attachment 1, and the findings from steps 1 through 7 above.
	8. Issues ECN(s) to Drafting Department to update facility drawings with new penetration location(s).

Design Engineer	9. Arranges for a survey of the penetration area with a rebar meter to attempt to identify any embedded conduits. If a conduit is thought to be in the cutting area, the installer must limit the supply of cooling water. Known conduits must be deenergized prior to starting drilling.
	10. Contacts AC Power to ensure they perform an AC power check. In some cases AC power will have already reviewed the area with Penetration Engineer.
Design Engineer	11. Prepares and obtains approvals of Attachments 3 and 4. Obtains a Penetration Permit from ESU per ENG-025 for each new penetration of a fire wall. Consult the Penetration Engineer for help in determining if it is a fire wall.
Installer	12. Satisfies all applicable requirements and prerequisites listed in Attachment 1 prior to commencing work, including obtaining approval of a Core Boring and Drilling Permit (Attachment 2).
	13. Performs all work to provide for a complete installation in accordance with applicable requirements and precautions listed in Attachment 1, the approved penetration procedure, and drawings.
	14. Notifies the Penetration Engineer for resolution in the event of a conflict between documents, drawings, and/or as-found conditions.
	15. Writes the penetration number on the wall / floor / ceiling in close proximity to penetration using black dry marker with approximately one-and-one-half (1 $^1/_2$) inch high numbers, upon completion of a penetration. Marker must be permanent type.
	16. Notifies QC to inspect the new core bore or altered penetration.
QC	17. Inspects penetrations from both sides to the extent possible to verify penetration integrity. Periodically monitor the work in progress for conformance to this and other applicable PPPL requirements (i.e., ENG-027 Fire Barrier Penetration Seal Installation and Repair).
Installer	18. Checks that all tools used in experimental areas are accounted for at the end of each work shift. Reports any missing tools immediately to the Penetration Engineer.
Design Engineer	19. Notifies the Penetration Engineer, the Site Protection Division, and the area Facility Manager when the penetration activities are completed.
Penetration Engineer	20. Works with the Operations Center to log Core Boring and Drilling Permits and issue follow-up notices for permits that have not been closed-out. Sends notifications of permits and close-outs to the Site Protection Division, the Fire Protection Engineer and QC for their awareness.
Site Protection Division	21. Reviews the log of Core Boring and Drilling Permits and maintains awareness of open fire barrier penetrations and fulfils related responsibilities per PPPL Procedure ENG-026.

Attachments:

1. Requirements, Prerequisites & Precautions
2. Core Boring and Drilling Permit (typical)
3. Core Boring and Drilling Field Procedure (typical)
4. Subcontractor Statement of Work for New D-Site and C-Site Core Boring Operations

REQUIREMENTS, PREREQUISITES and PRECAUTIONS

REQUIREMENTS

1. Overcuts are not permitted unless noted on the approved drawing.
2. All work shall take place under the supervision of the PPPL Penetration Engineer.
3. Penetrations Permits, and where applicable Flame Permits, shall be obtained prior to starting each penetration.
4. For work in the TFTR Test Cell or Test Cell Basement (including the tritium area), PPPL Health Physics will smear the affected areas for tritium contamination prior to drilling, and will specify any required radiological precautions prior to the start of drilling.
5. In the TFTR Test Cell and Test Cell Basement the installer must provide a means to filter water during the cut and send it directly to the LEC tanks.
6. Installer must install polyethylene sheeting on both sides of the cuts to protect existing equipment.

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7. The cutting equipment must be grounded and if possible plugged into a "Ground Fault Interrupter" adapter or circuit, and the mechanic must wear Class "O" electrical insulating gloves provided by ES&H. All persons in the area must not make any other body contact with the cutting machine unless additional insulating measures are taken. An assistant operating a vacuum machine to remove water from the floor, which is potentially in electrical contact with a ground fault (severed conductor), must wear rated gloves as a minimum, and a rated apron if the device is a metallic conductor.

NOTE: CUTTING EQUIPMENT THAT IS ALL PLASTIC DOES NOT REQUIRE GROUNDING

8. Safety goggles and steel toed shoes must be worn by all persons near the drilling/cutting operations.
9. The installer is responsible for securing all cut-out portions / plugs to assure that they do not fall (especially ceiling and floor cut-outs / plugs).
10. Personnel must be available on the breakthrough side of the cut at the time of the breakthrough and equipment must be protected as specified by the cog engineer. If open holes exist in the general area of the cut personnel must monitor the work area and break through side throughout the cutting process or limit the cooling water introduced.
11. The work area must be wiped down and cleaned periodically during the cutting process. In the TFTR Test Cell and Test Cell Basement, material used for wiping must be released by PPPL Health Physics prior to disposal unless otherwise instructed by PPPL Health Physics.
12. The installer must provide temporary seals for the penetrations as soon as they are completed in a manner acceptable to the Penetration Engineer.
13. The installer will install any necessary scaffolding in accordance with the requirements of PPPL ES&H Directive 5008, Section 1, Item 1.6.2.
14. The installer must provide any lift equipment needed to get equipment onto the scaffolding.
15. The installer must provide cutting tools capable of handling the rebar that exists in the location being cut / drilled.

PREREQUISITES

Installers shall ensure the following prerequisites are completed prior to commencement of activities:

1. Obtain work permit(s) for any Tritium, TFTR Test Cell / Test Cell Basement, NSTX Test Cell and DARM work.
2. Obtain approval of a Core Boring and Drilling Permit (Attachment 2) prior to performing any work involving drilling a new penetration or opening an existing one.
3. Schedule work on the Rollover Schedule in order to minimize interference with other activities.
4. Schedule any work requiring health physics support with the Health Physics Manager
5. Notify QC and the Facility Manager for the area prior to start of work.

PRECAUTIONS

Installers shall ensure the following precautions are taken prior to and during activities:

1. Become familiar with, and avoid damaging existing facilities, equipment, cable trays, and cables of all voltages. Walking or standing on cable trays is not permitted without the approval of the Electrical Safety Engineer. (See form 5008.2-1, "Permit for climbing or walking on cable trays"). The Penetration Engineer can be contacted to help get approvals.
2. Contact the Shift Supervisor prior to starting work in the Test Cell, Test Cell Basement, or the DARM, also contact the Construction Manager before staring work in the NSTX Test Cell. It should be noted that testing may be in progress and certain areas are hazardous due to the presence of live equipment/buswork in close proximity to the work area.
3. Wear hard hats at all times in Test Cell and Test Cell Basement. Gloves, safety goggles, face shields, respirators, etc. shall be worn as specified by Industrial Hygiene (IH).
4. Ensure that the work is properly planned and safe physical supports are provided; in particular, ladders, platforms, etc. must be used in accordance with ES&HD-5008, Environmental Safety & Health Manual.
5. Observe all safety requirements for work as required by the Shift Supervisor and/or the Construction Manager.
6. Perform all work in accordance with ES&HD-5008, PPPL Environmental Safety & Health Manual. Installer shall ensure that all safety barricades and signs set up by others are obeyed.
7. Wear disposable dust masks, goggles and/or protective equipment, for any work that produces chips or dust from drilling, cutting or grinding or as specified by Industrial Hygiene (IH). Final Clean up shall be with a vacuum and/or mop (wet method) as determined by the installer.
8. Obtain a check by a Health Physics representative of all equipment, material, hardware, and devices to be removed from the TFTR Test Cell or Test Cell Basement for radiation contamination. Refer to OP-AD-7, Health Physics requirements for removing radioactive material from TFTR.
9. Secure the area at the end of each work shift to assure safe conditions.

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Core Boring and Drilling Permit (Typical)			Attachment 2

Core Boring and Drilling Permit

COGNIZANT/DESIGN ENGINEER: **Date:**

Penetration Number:

Request: **Drill /Install New Penetration**
Modify Existing Penetration

ECN #:
WP #:
Procedure #:
Reference Drawing(s):
Cost Center: **Work Package:** **Job:**

PENETRATION LOCATION & DESCRIPTION

Site: **Bldg. / Area:** **Floor Elevation:**

Nearest Bldg. Columns **Located On: Wall or Ceiling or Floor**

Type: Circular or Rectangular **Sleeve: Yes or No**

Center or Bottom Elevation of Penetration: **Gross Area:**

System (s)/Service:

Equipment Passing through Pen (Pipe, Conduit, etc.):

Field Walkdown Performed? **Yes or No or N/A** **By:**

Required Drawings Reviewed: **Yes or No or N/A** **By:**

SCHEDULE & APPROVAL

Penetration Engineer Approval to Proceed:

ESU Permit No.: **Date:**

Work to be Performed Starting (Date):

Duration (Days/Weeks):

Estimated Resealing Date: **Actual Date:**

Field Work Performed by:

New Penetration Boring, Cutting and Drilling Procedure

For Penetration(s) _____

prepared by: _____
Design Engineer

This procedure is for cutting and drilling of penetrations in areas **except** for the TFTR test cell and TFTR Test Cell Basement

For cutting and drilling in the TFTR test cell or Test Cell Basement see the penetration engineer for further instructions.

1.0 Scope

This document describes the penetration(s) that need to be installed as described in Core Boring and Drilling Permit permit(s):

Permit No.	Cognizant Engineer

This document describes how the work must be performed and lists the portions of work that are the responsibility of PPPL and those that are the responsibility of the subcontractor.

2.0 Prerequisites and Requirements

2.1 The mechanics performing the work must take and pass PPPL General Employee Training (GET) if penetration work is expected to last longer than 5 working days.

2.2 PPPL will mark the locations of the penetrations on the floor and walls.

Penetration Locations Marked _____
Design Engineer, Date

2.3 **The installer is responsible for securing all cut out portions/plugs** to assure that they do not fall (especially ceiling/floor cut-outs). Personnel must be available on the breakthrough side of the cut at the time of breakthrough.

2.4 The contractor will supply and install any necessary scaffolding in accordance with the requirements of PPPL ES&H Directive 5008, Section 1, Item 1.6.2. All scaffolding must be reviewed and approved by the PPPL Construction Manager prior to their use.

2.5 Water associated with the concrete core boring is to be collected and not allowed to spread beyond the work area.

2.6 PPPL will review facility drawings and survey the penetration areas with a rebar meter to attempt to identify any embedded conduits. If a conduit is thought to be in the cutting area, the contractor must limit

the supply of cooling water. Attempts will be made to deenergize any conduits found prior to starting drilling.

2.6.1 Rebar Meter Scan Results and Comments

Rebar Scan Completed _____
Design Engineer, Date

Rebar in area: _____

Comments:

2.6.2 A.C. Power is notified and in agreement

A.C. Power Signoff _____
A.C. Power, Date

Comments:

2.7 The cutting equipment must be grounded if possible and plugged into a "Ground Fault Interrupter" adapter or circuit, and the mechanic must wear Class "O" electrical insulating gloves provided by PPPL and insulating boots. All persons in the area must not make any other body contact with the cutting machine unless additional insulating measures are taken.

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2.8 The work area must be wiped down and cleaned periodically during the cutting process and after the work has been completed.

2.9 The contractor must provide cutting tools capable of handling the rebar that exists in these locations. See comments from the rebar scan above.

2.10 Safety goggles and steel toed shoes must be worn by all persons near the drilling/cutting operations.

2.11 PPPL will install any sleeves required in the penetrations.

2.12 PPPL will provide temporary seals for the penetrations if needed.

2.13 QA should be used to monitor the work in progress.

2.14 Penetrations Permits, and where applicable Flame Permits, shall be obtained by PPPL personnel prior to starting each penetration.

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Subcontractor Statement of Work for New D-Site and C-Site Core Boring Operations - Suggested Format and Content			Attachment 4

Subcontractor Statement of Work for New D-Site and C-Site Core Boring Operations

This document is applicable for Penetration Number(s)

_____
(List Penetration Numbers)

In Support of

_____
(List System or Components That Pass Through Penetration)

Prepared By: _____
Design Engineer

Reviewed by: _____
ES&H Manager

Reviewed by: _____
Quality Assurance

Approved by: _____
Penetration Engineer

1.0 SCOPE

This document describes the penetrations that need to be installed for

_____.
System/Penetrating Item

This document also describes how the work must be performed and lists the portions of work that are the responsibility of PPPL and those that are the responsibility of the subcontractor. *(This attachment is a suggested format and content that must be tailored to the specific work it is to be used for.)*

The penetration sizes and locations are:

Penetration Number ***Description***
(*list all applicable penetrations, and a short description of size and location of the penetration)*

2.0 APPLICABLE DOCUMENTS

2.1 PPPL Environmental, Safety and Health Manual, PPPL ESH 5008 (requires compliance with OSHA regulations)

2.2 List Of Applicable PPPL Drawings

Penetration Number ***Drawing Name and Number***

3.0 Prerequisites and Requirements

The requirements and precautions listed below are condensed from the main body of ENG-028. All parties involved with this particular job are responsible for reading the full list of precautions and conditions in ENG-028.

3.1 PPPL Responsibilities

3.1.1 PPPL will mark the locations of the penetrations on the floor and walls.

3.1.2 PPPL will install polyethylene sheeting or other measures on both sides of the cuts to protect existing equipment.

3.1.3 PPPL will provide access to 208v or 408v welding receptacles as required.

3.1.4 Water associated with the concrete core boring is to be filtered and sent directly to a liquid effluent collection system drain, or as otherwise directed by PPPL Health Physics. The plug removed from the core drilling shall be turned over to HP.

3.1.5 PPPL will review facility drawings and survey the penetration areas with a rebar meter to attempt to identify any embedded conduits. If a conduit is thought to be in the cutting area, the contractor must limit the supply of cooling water. Attempts will be made to de-energize any conduits found prior to starting drilling.

3.1.6 PPPL personnel must be available on the breakthrough side of the cut at the time of the breakthrough and equipment must be protected as specified by the cog engineer.

3.1.7 PPPL will install any sleeves required in the penetrations.

3.1.8 PPPL will provide temporary seals for the penetrations if needed.

3.1.9 QA should be used to monitor the work in progress.

3.1.10 Penetrations Permits, and where applicable Flame Permits, shall be obtained by PPPL personnel prior to starting each penetration.

3.2 Contractor Responsibilities

3.2.1 The mechanics performing the work must take and pass PPPL General Employee Training (GET) if penetration work is expected to last longer than 5 working days.

3.2.2 The contractor will supply and install any necessary scaffolding in accordance with the requirements of PPPL ES&H Directive 5008, Section 1, Item 1.6.2. All scaffolding must be reviewed and approved by the PPPL Construction Manager prior to their use.

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3.2.3 The cutting equipment must be grounded if possible and plugged into a "Ground Fault Interrupter" adapter or circuit, and the mechanic must wear Class "O" electrical insulating gloves provided by PPPL and insulating boots. All persons in the area must not make any other body contact with the cutting machine unless additional insulating measures are taken.

3.2.4 The work area must be wiped down and cleaned periodically during the cutting process and after the work has been completed.

3.2.5 The contractor must provide cutting tools capable of handling the 1" rebar that exists in these locations.

3.2.6 Safety goggles and steel toed shoes must be worn by all persons near the drilling/cutting operations.

3.2.7 The contractor is responsible for securing all cut-out portions / plugs to assure that they do not fall .