# Working Under PSSP Tag-out – Category 3 Part 2 Safe-Mgmt-113



January 2020

# Training and development Participant Guide



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# **Course Introduction**

Welcome to the **Working under PSSP tag out - Category 3 (Part 2)** training course. Today you'll learn about the roles and responsibilities of a PSSP Category 3 worker when working on the Transmission and Distribution system. This includes substations.

Approximate time required to complete: 1 to 1<sup>1</sup>/<sub>2</sub>hours.

### Audience

BC Hydro employees or Contract workers who wish to qualify for authorization to PSSP Category 3 or higher.

### **Prerequisites**

- Basic Safety in BC Hydro Facilities PSSP Category 2.
- Working on the Power System PSSP Category 3 (Part 1).

### **Course Objectives**

At the end of this course, you will be able to:

- Identify the roles and responsibilities of a Category 3 worker.
- Explain the purpose of Safety Protection Guarantees.
- Understand the importance of tags in the PSSP process.
- Identify the different types of Safety Protection Guarantees.
- Explain the purpose of Protection Extensions.
- Describe the process for obtaining and returning a Protection Extension.

### **Course Topics**

- Introduction to PSSP Category 3
- Safety Protection Guarantees, and
- Protection Extensions

#### Note

You can review a glossary of PSSP terms in the appendix.

### **Completion Requirements**

At the end of this course module, you will write an examination to demonstrate your understanding of the information presented in both **Working on the Power System** and **Working under Power System Safety Protection (PSSP) Tag-Out**.

#### Note:

This course alone does not give a worker authorization to work at a local site. Prior to commencing work, workers must complete Functional Component training and receive local information for the location where the work will be performed. Authorized workers must hold a valid up-to-date PSSP authorization (renewed every two years).

# **Lesson 1. Introduction to PSSP Category 3**

#### Purpose

This lesson provides an introduction to the duties and responsibilities of the PSSP Category 3 worker.

#### Objectives

On completion of this lesson, you will be able to:

- Identify the roles and responsibilities associated with each category of PSSP authorization.
- Explain the Category 3 worker's relationships with workers assuming roles at other categories of authorization.
- Identify tasks that the Category 3 worker can and cannot perform.

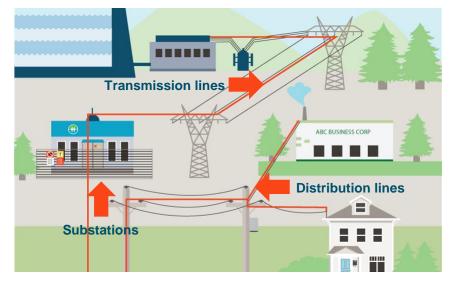
#### **Topics**

This lesson covers the following topics:

- PSSP and Safety Protection
- PSSP Categories of Authorization
- The Category 3 worker
- Introduction to SPGs
- Establishing Worker Protection with SPGs

# **PSSP and Safety Protection**

The process of Safety Protection used for BC Hydro transmission and distribution power system equipment is called Power System Safety Protection (PSSP). PSSP is employed on any work involved on any part of the T&D system including substations, distribution lines and transmission lines.



**PSSP** incorporates:

- A strict set of procedures using Safety Protection Guarantees (SPGs) and tags to establish the required constraints that provide worker protection from power system hazards.
- A hierarchical system of authorization to perform different roles within those procedures.



PSSP is explained in System Operating Order (SOO) 1T-12 and in Safety Practice Regulation (SPR) Rule **600.** 

# **PSSP Categories of Authorization**

PSSP Categories of Authorization relate only to the worker's level of authority with respect to Safety Protection for work on the power system.

The categories of PSSP authorization are based on the hazards and complexity of the associated work. The higher the authorization Category, the more responsibility the worker is allowed to take for Safety Protection. Achieving a higher Category of authorization requires formal training (such as this course), as well as experience with the PSSP procedures.

Category	Authorization
6	<ul> <li>Perform Person in Charge (PIC) Duties:</li> <li>Receive Operating Authority.</li> <li>Perform or direct the switching required to establish isolation for Safety Protection.</li> <li>Issue Safety Protection Guarantees, Live Line Permits and Assurance of Non Reclose permits.</li> </ul>
5	<ul> <li>Receive Safety Protection Guarantees, Live Line or Assurance of Non Reclose Permits and Apply Self Protection.</li> <li>Only workers authorized to Category 5 can be authorized to switch Level I – IV equipment.</li> </ul>
4	Certified Utility Arborists engaged in vegetation management on the Power System.
3	<ul> <li>Authorization to work on the power system as follows:</li> <li>Work in proximity to the power system that does not require a Safety Protection Guarantee.</li> <li>Work under the direction of a Category 5 crew member who has received a Safety Protection Guarantee.</li> <li>Workers required to receive a Protection Extension.</li> </ul>
2	Authorization limited to accessing the power system (e.g. entering stations, work sites etc.).
1	Customer Isolation Information (Customers do not hold PSSP authorization).

#### Remember:

Any worker can assume responsibilities below his or her Category of authorization. For example, a Category 5 worker might perform work at the Category 3 level.

# **The Category 3 worker**

Category 3 personnel are a diverse group and include a variety of workers.



There are some authorizations and limitations to Category 3 roles. Category 3 is the lowest level of authorization where workers can do work on power system equipment under direct supervision from the Category 5 worker.

As a Category 3 worker, you must know your responsibilities and never assume responsibilities that you are not authorized for. Any violation of this rule is a serious safety infraction.

### Authorization

A Category 3 worker is permitted to work on the power system under the following conditions:

- As a member of the Category 5 Safety Protection Guarantee holder's crew.
- With a Clearance in place, receive a Protection Extension from the Category 5 Clearance Holder.

### Limitations

A Category 3 worker is not permitted to:

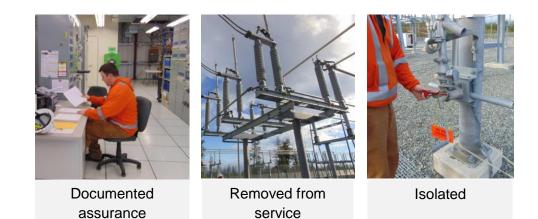
- Request or receive a Safety Protection Guarantee from the PIC.
- Apply or remove Worker Protection grounding/bonding or blocking devices.
- Apply or remove "Do Not Operate grounding/blocking protection" tags, unless they are directly supervised by a Category 5 worker.

# **Introduction to SPGs**

PSSP uses a strict set of procedures called Safety Protection Guarantees (SPGs) as well as accompanying tags, to establish the constraints required for worker protection from power system hazards. And, to perform the roles within these procedures, workers must be authorized to the different PSSP categories of authorization.

### What is an SPG?

Term	Definition
Safety Protection Guarantee	An SPG is a documented assurance that conductors or electrical or mechanical equipment on the Distribution and Transmission portion of the power system is removed from service, isolated and will remain isolated.



SPGs are enforced by "Do Not Operate" tags and are documented on safety protection forms.

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There are three kinds of SPGs used at BC Hydro: Clearance, Test and Work Permit and Self Protection.



We'll learn more about these later in the course.

# **Establishing Worker Protection with SPGs**

The same general process is used to establish worker protection for all types of SPG. It involves three key roles: the Category 6 worker (Person in Charge), the Category 5 worker, and the Category 3 working under the direction of the Category 5 SPG holder to perform the work.

Category 6 worker (PIC)	Here are the main steps of the	Category 5 worker	Category 3 worker, working under direction of Category 5 worker
	Identification	<ul> <li>The PIC and the Category 5 work up the SPG by:</li> <li>A. Identifying the equipment</li> <li>B. Identifying the primary so energy and their isolating</li> <li>C. Identify any additional sou energy.</li> </ul>	to be worked on. urces of hazardous device(s).
	Switching	The Category 5 worker makes an PIC to have the equipment removisolation switching performed.	
	SPG issued	The PIC updates the mimic board Category 5 worker with the appro Guarantee, assuring the equipme remain isolated.	priate Safety Protection
	Safe work zone	The Category 5 worker establishe zones by:	es the defined safe work

	<ul> <li>A. Installing work area barriers and signage as required.</li> <li>B. Applying worker protection grounding and bonding.</li> <li>C. If the work zone borders on energized equipment, installing any additional safety barriers or cover-up required.</li> </ul>
Tailboard	Immediately before work starts, the Category 5 worker conducts and documents a tailboard meeting with the Category 3 crew leader and crew to review the hazards, isolation, and other pertinent details of the worker protection.
Perform work	The Category 3 crew leader and crew then performs the required work. If the scope of the work changes in any way from what was discussed in the tailboard meeting, the crew must consult with the Category 5 worker, who must review the Safety Protection and redo the tailboard <b>before</b> work can proceed.

# **Lesson 2. Safety Protection Guarantees**

#### Purpose

This lesson describes the different types of Safety Protection Guarantees (SPGs) used in PSSP and explains the Category 3 worker's responsibilities as a crew member under a Category 5 worker's SPG.

#### **Objectives**

On completion of this lesson, you will be able to:

- Identify which type of SPG is required for different types of work.
- Explain the purpose of the tags used with SPGs.
- Describe how each type of SPG ensures the safety of workers.
- Explain the rules and limitations for each type of SPG.
- List the Category 3 worker's safety responsibilities when working under an SPG.

#### Topics

This lesson covers the following topics:

- PSSP tags
- General rules for tags
- Isolation/"Do Not Operate" tags
- Grounding/blocking protection tags
- Caution tags
- Safety Protection Guarantees
- Working under a Safety Protection Guarantee
- Your responsibilities

# **PSSP** Tags

### **Overview**

Tags are a very important part of the PSSP process. They ensure the safety of workers by documenting the current status of power system equipment and securing the Safety Protection by warning workers not to operate equipment that might result in injury or harm to other workers.

The three types of PSSP tags that Category 3 workers regularly see are isolation tags, grounding/blocking protection tags, and caution tags.

### **Isolation tags**

"Do Not Operate" tags placed on isolation devices to enforce Safety Protection Guarantees.



### Grounding/blocking protection tags

Personalized "Do Not Operate" tags placed on Worker Protection grounding/blocking and blocking devices.



## **Caution tags**

Placed on equipment to identify unusual status.

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# **General rules for tags**

Using tags correctly is key for worker safety. There is a general set of rules that must be followed when using tags:

- Use only official tags.
- Use only for the purpose for which they are approved.
- Place or remove only if you're the worker arranging the protection or on the instructions of that worker.
- Place so they are readily visible to workers and located to clearly indicate the device associated with them.
- Do not locate where they are accessible to the public, unless adequate precautions are taken to prevent their removal.

# Isolation/"Do Not Operate" tags

Term	Definition
"Do Not Operate" isolation tags	Applied to isolation devices such as electrical switches, line cuts or pressure supply valves to indicate that the device must not be operated because a Safety Protection Guarantee depends on them. They can only be applied by a Category 5 worker who is qualified and authorized to perform the isolation.

### **Clearance tags**

- Applied by an authorized Category 5 worker only under direction of the Person in Charge (PIC).
- Used to secure the isolating devices for Clearances.



## **Test and Work Permit tags**

- Applied by an authorized Category 5 worker only under direction of the PIC.
- Used to secure the isolating devices for Test and Work Permits.



#### Note

Only one Test and Work Permit shall be issued on the same conductor or equipment at any one time.

### Self protection tags

- Inscribed with the name of the worker who applied it.
- Applied by an authorized Category 5 worker without direction of the PIC.
- Used to secure the isolating devices for self protection.



# **Grounding/blocking protection tags**

Definition		
te - A personalized "Do Not Operate - grounding/blocking protection" tag must be applied to any Worker Protection grounding/bonding and blocking devices that are not under the direct, continuous control of the Category 5 worker who applies the grounding/blocking device or devices. It is inscribed with the name of the person who applies it.		
C BC Hydro 10226-Mar16 DO NOT OPERATE G / BLOCKING PROTECTION		

This tag ensures that the device is not removed by anyone other than the Category 5 SPG holder or someone under their direction.

#### Note

If for any reason this rule cannot be adhered to, it must be referred to the appropriate senior BC Hydro manager.

The PIC has no control over the application or removal of Worker Protection grounding/bonding and blocking devices or "Do Not Operate - grounding/blocking protection" tags.



You can find more information on "Do Not Operate - grounding/blocking protection" tags in Safety Practice Regulation (SPR) Rule **611.** 

# **Caution tags**

Term	Definition
Caution tags	These are informational tags that advise workers of a condition that might lead to a service interruption, create an unusual situation or require a special operating procedure.

Caution tags are applied only by a Category 5 or higher worker on power system equipment under direction of the Person in Charge. It must include either a description of the condition or a reference to where that information is recorded.

They must not be used as a form of Worker Protection or isolation enforcement in place of a "Do Not Operate" tag.



# **Safety Protection Guarantees**

There are three different types of Safety Protection Guarantees:

- Clearances
- Test and Work Permit and
- Self Protections

### Clearances

Clearances are the most common type of Safety Protection Guarantee. They are used for most work on the power system.

Term	Definition
Clearance	A Clearance is a documented assurance from the Person in Charge (PIC) to a Category 5 or higher worker that the equipment is isolated and ready for grounding/bonding and blocking procedures.



### The Category 5 Clearance holder responsibilities:

- Follows the correct procedures to apply the necessary Worker Protection grounding/bonding and mechanical blocking.
- Attaches a "grounding/blocking protection" tag, with their own name inscribed, to any grounding/bonding and blocking device that is not under their direct, continuous control.
- Explains the Safety Protection to all members of their crew in a documented tailboard meeting.
- Install barriers and cover up as required.



### Multiple crews requiring the same isolation

The isolation established for the Clearance will provide a safe work zone for all the work to be done by the Clearance Holder's crew. If multiple crews need to work on the same equipment and require the same isolation (that is, using the same isolation devices), there are two alternatives.

- 1. A Category 5 or higher worker on each crew may obtain a separate Clearance for the work from the PIC.
- 2. A Category 3 worker or higher may obtain a Protection Extension from the Clearance holder.



#### Note

A Protection Extension is a stated assurance issued by a Category 5 Clearance holder that specified equipment is isolated and grounded/bonded or blocked as required, and is safe to work on. This will be covered in more detail later on in this course.

### **Test and Work Permit**

Term	Definition
Test and Work Permit	Test and Work Permits are special SPGs issued when the work to be performed includes hazardous electrical or mechanical tests, such as Doble testing.

All the rules to establish worker protection under a Test and Work are the same as a Clearance.

#### What makes a test and Work Permit different from other SPG's?

- Grounding/blocking may be removed for testing but must be reapplied immediately after test is complete.
- You can only have one permit at a time.
- The Permit Holder must remain on site during testing.





You can learn more about Test and Work Permits in the Safety Practice Regulations rule **605** and **606**.

#### Note:

The isolation devices that provide the isolation for the Test and Work Permit may NOT be tested under the permit or altered in any way.

### **Self Protection**

Term	Definition	
Self Protection	Self Protection is a form of Safety Protection Guarantee that Category 5 workers can establish without the permission or direction of the Person in Charge	



The rules and procedures for Self Protection are in Safety Practice Regulations rule **607** and **608**.

### **Application restrictions**

- Auxiliary power sources to equipment.
- Lateral distribution lines less than 60 kV.
- Low-voltage station equipment not shown or listed on Operating One-Line diagrams.
- Compressors or pumps and associated piping systems.





- The authorized worker must tag isolation devices for Self Protection with "Do Not Operate Self Protection" tags inscribed with his or her own name.
- The authorized worker must apply or direct the application of all required grounding/bonding and mechanical blocking, as well as any required "Do Not Operate grounding/blocking" tags.
- Hazardous testing is not allowed on equipment protected under Self Protection.
- Only one Self Protection may be in place at a time on a high-voltage distribution line, and a single isolation point must establish Safety Protection of the line.
- No more than one self protection can be in place on a high voltage distribution line. If multiple crews require the same isolation a Clearance will be required.

### Authorized worker responsibilities

- The authorized worker is personally and solely responsible for the safety of the workers in their crew.
- Before applying Self Protection, the authorized worker must carefully assess the risk. If the risk is high, he or she must consult the PIC.
- The authorized worker must remain on site at all times to supervise other workers.



# **Working under a Safety Protection Guarantee**

As a Category 3 member of a crew working under a Safety Protection Guarantee, your safety depends to a large extent on the protections established by the PIC and the SPG Holder. Never take those protections for granted!

A Category 3 worker is responsible for asking the following questions at the tailboard:

- Do you have a clear understanding of the equipment you are working on?
- Has the isolation from the normal sources been clearly identified by the Category 5 worker on the One Line drawing?
- Have the hazards on the job site been clearly described as well as the method to reduce those hazards?
- Has the safe work zone been clearly described and established?
- And Have the work procedures been clearly described?



#### Note

If you are unclear on any of these items, you must ask for clarification from the SPG Holder before signing the tailboard.

# **Your responsibilities**

If you have any concerns with the protections in place, communicate them clearly with the Safety Protection Guarantee Holder. Don't proceed until you are satisfied the protections are adequate.

If the scope of your job changes, get permission from the SPG Holder before proceeding with the work. If the scope changes, the tailboard must be redone.

#### Note

Do not under any circumstance tamper with isolation, grounding/bonding or blocking devices, or the tags that secure them. Talk with the SPG Holder about any changes that may be required to the safety protection.

# **Lesson 3. Protection Extensions**

#### Purpose

This lesson explains how Protection Extensions are used and describes the procedures for obtaining and returning a Protection Extension.

#### Objectives

On completion of this lesson, you will be able to:

- Explain the relationship between a Protection Extension and a Clearance.
- Describe the circumstances where a Protection Extension is appropriate for Safety Protection.
- Identify the different responsibilities of the Clearance Holder and the Protection Extension Holder.
- Explain the steps required to request and return a Protection Extension.

#### Topics

This lesson covers the following topics:

- About Protection Extension.
- Rules for Protection Extensions.
- Obtaining and returning a Protection Extension.

# **About Protection Extensions**

Term	Definition
Protection Extension	A Protection Extension is a stated assurance by a Clearance holder that specified equipment is isolated and Grounded/Bonded or Blocked, as required, and is safe to work on. It is issued by Clearance Holder (minimum Category 5) to a Category 3 or higher worker.

The Protection Extension holder is responsible for the safety of his or her own crew members. in the absence of the Clearance Holder and is not permitted to alter the safety protection measures in any way.

#### Note

It is a type of Clearance and therefore must follow all the rules and restrictions outlined in the Safety Protection Regulations regarding Clearances. Clearances are the only type of SPG that allow the holder to issue a Protection Extension.

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### **Circumstances where a Protection Extension is used**

# The Category 5 Clearance holder is leading the work but must leave the worksite.

The Clearance holder issues a Protection Extension to a Category 3 or higher authorized member of the crew so the crew can keep on working.

# The Category 3 worker is leading the work and needs Safety Protection.

A Category 5 worker obtains the Clearance and establishes safe working conditions, then issues a Protection Extension so the Category 3 worker and crew can do their work safely.

# When more than one crew is working on the same isolated equipment.

The Clearance holder issues Protection Extensions to Category 3 or higher authorized workers in other crews.

## **Rules for Protection Extensions**

Both the Clearance holder and the Protection Extension holder have various responsibilities and must follow strict rules and guidelines when it comes to using Protection Extensions.



These rules and requirements are found in the Safety Protection Regulations **603** and **604** with the rules on Clearances.

### **Clearance holder responsibilities:**

- Establish the safe working conditions.
- If multiple crews are working on the same equipment, provide each crew lead with a Protection Extension.
- Educate the Protection Extension holder(s) regarding the risks and protections in place.
- Return the Clearance only when all Protection Extensions have been returned.



### Protection Extension holder responsibilities:

- Educate the crew members about the risks and protections in place.
- Refrain from altering the Safety Protection measures in any way.
- If the scope of work changes, get permission from the Clearance holder before continuing the job.
- Remain on site while the crew is working.
- When the job is finished, return the Protection Extension to the Clearance holder.



# **Obtaining and returning a Protection Extension**

Here's an outline of the process to obtain and return a Protection Extension.

	<b>Step 1:</b> Issuing the Protection Extension (Category 5 Clearance holder)	<ul> <li>Verifies the crew lead authorization to Category 3.</li> <li>Assesses the work to be performed.</li> <li>Records the Protection Extension details.</li> <li>If necessary, installs additional Worker Protection grounding/bonding or blocking devices, erects barricades or takes other measures to ensure that the work to be undertaken does not create a hazard to life, property or service.</li> </ul>		
		<ul> <li>Supervises installation of "Do Not Operate – grounding/blocking protection" tags.</li> </ul>		
		<ul> <li>Informs worker receiving the Protection Extension that work may proceed.</li> </ul>		
	Step 2: Working with the Protection Extension (Category 3 crew lead)	<ul> <li>Monitors the work progress, ensuring adherence to the safety guarantee limits.</li> </ul>		
		<ul> <li>Holds regular tailboard meetings to review the hazards, isolation points and work area limits. Remember, all workers have the right and the obligation to ask for explanations of isolation, grounding/bonding and blocking for the job.</li> </ul>		
		<ul> <li>If the scope of work changes, notifies the Clearance holder before continuing with the new scope work. The Clearance holder will redo a tailboard with the crew to review any additional hazards, isolation points and work area limits.</li> </ul>		



Step 3: Returning the Protection Extension (Category 3 crew lead)	•	Have the crew clear the work zone, including removing any tools and equipment. Inform the Category 5 Clearance holder that the work is complete, all workers and equipment are clear of the work zone and the Protection Extension is ready to be returned. When directed by the Clearance holder, remove all
	•	grounding/blocking tags bearing their name.
<b>Step 4:</b> Returning the Protection Extension (Category 5 Clearance holder)	•	Records name, time and date of Protection Extension return on the Safety Protection form. Documents the issue and return, ensures the Clearance is not returned until all Protection Extensions have been returned.

# Wrapping up

You should now have a good understanding of what safe work procedures under PSSP Tag Out look like for Category 3 workers.

You learned about the roles and responsibilities for a Category 3 worker, why and how to use different types of Safety Protection Guarantees, how to use PSSP tags, and the purpose and process for Protection Extensions.



You should now be able to:

- Identify the roles and responsibilities of a Category 3 worker.
- Explain the purpose of Safety Protection Guarantees.
- Understand the importance of tags in the PSSP process.
- Identify the different types of Safety Protection Guarantees.
- Explain the purpose of Protection Extensions.
- Describe the process for obtaining and returning a Protection Extension.

# Appendix

## **Terms and Definitions**

The following table lists common terms and their definitions used throughout this course.

Term	Definition
Safe work zone	The Safe work zone are the constraints that will be applied to a work site once a Safety Protection Guarantee is in effect. This will include but not be limited to:
	• Testing to verify the equipment is de energized.
	Applying Worker Protection grounding and blocking.
	<ul> <li>Applying any required barriers and cover up communication of the constraints to all workers.</li> </ul>
Mimic board	A mimic board is a representation of the configuration and status of an assigned portion of the power system, complete with device designations.
Isolation switching	Isolation switching is a prescribed assignment to establish isolation required for a Safety Protection Guarantee. For electrical equipment, the normal sources of hazardous energy have been disconnected by opening and securing all associated switches or by making a line or bus cut. For mechanical equipment, the equipment has been rendered and secured non-operative by installing a blank in a pipe line, closing a valve, depressurizing, draining, venting, or other effective means.
Person in Charge (PIC)	A Person in Charge (PIC) is a PSSP Category 6 worker. On the Integrated Transmission and Distribution system, the PIC will be on duty at BC Hydro's Real Time Operations (RTO) control centre.
	Note: The (PIC) has the exclusive authority for their assigned portion of the power system to establish the conditions for, and to issue, Safety Protection Guarantees (SPGs).
Power System Safety Protection (PSSP)	Power System Safety Protection (PSSP) is defined as the constraints that must be applied to the power system to provide Worker Protection from power system hazards during prescribed work.
Tag out	Tag out is a process that uses tags to secure and enforce Safety Protection Guarantees (SPGs).
Safety Protection	Safety Protection is the process for making equipment safe to work on. It includes:
	Isolating the equipment from all primary hazardous

	sources of energy.
	<ul> <li>Applying tags (always) and locks (where applicable) to the isolation devices.</li> </ul>
	<ul> <li>Applying grounding/bonding and mechanical blocking devices, as required, which provides worker- controlled protection from the hazards of accidental energization from all energy sources.</li> </ul>
Authorization	Authorization is permission given to an individual to assume specific roles and responsibilities within a process.