


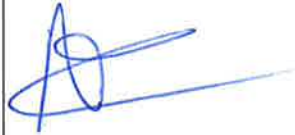


# Specification

## Loading of the Cocase irradiator with a $^{60}\text{Co}$ sealed source

CEA Paris-Saclay  
Installation 218 – Bat. 126

Drum container: Name, Fonction, Signature				
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CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <sup>60</sup>Co source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p>
		June 2021

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INDICE	DATE	Progress nature	PAGES CHAPTERS
A	June 2021	First version	/

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <p>June 2021</p>
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## Table of contents

<b>OBJECT.....</b>	<b>4</b>
<b>REFERENCE DOCUMENTS.....</b>	<b>4</b>
<b>1. DESCRIPTION OF THE COCASE INSTALLATION AND OF THE ICO4F IRRADIATOR.....</b>	<b>5</b>
1.1. THE COCASE INSTALLATION.....	5
1.2. THE $^{60}\text{Co}$ SOURCE .....	5
<b>2. DETAILED DESCRIPTION OF THE REQUEST .....</b>	<b>6</b>
2.1. PHASE 1: PREPARATION OF OPERATIONS .....	6
2.2. PHASE 2: TRANSPORT OF THE IRRADIATOR TOWARD THE OPERATING SITE .....	7
<i>Provision of a container.....</i>	7
<i>Packaging .....</i>	7
<i>Loading of the container and transportation. ....</i>	8
2.3. PHASE 3: PROVISION OF A $^{60}\text{Co}$ SOURCE.....	9
2.4. PHASE 4: LOADING OF THE IRRADIATOR WITH THE SOURCE .....	9
2.5. PHASE 4: TRANSPORT OF THE LOADED IRRADIATOR FROM OPERATING SITE TO CEA-SACLAY .....	9
<i>Packaging .....</i>	10
<i>Loading of the container and transportation .....</i>	10
<i>Unloading of the container.....</i>	10
<b>3. VALIDATION TESTS AT CEA-SACLAY .....</b>	<b>11</b>
<b>4. DOCUMENTS AND INFORMATIONS TO RETURN WITH THE OFFER .....</b>	<b>11</b>
<b>5. CEA REPRESENTATIVES.....</b>	<b>11</b>

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <p>June 2021</p>
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## OBJECT

In the frame of its activities in research and instrumentation and its irradiation provisions for external research laboratories or industries, the “Institut de recherche sur les lois fondamentales de l’Univers” (IRFU) of CEA PARIS-SACLAY operates an irradiation facility named “COCASE”, which uses a gamma-irradiator of type “ICo4F” loaded with a  $^{60}\text{Co}$  sealed source.

This call for proposal concerns the loading of the irradiator by a new  $^{60}\text{Co}$  source, after the removal of the preceding one in 2020.

This provision includes five phases:

1. The preliminary studies;
2. The transport of the empty ICo4F irradiator between CEA-Saclay and the operating site<sup>1</sup>;
3. The provision of a  $^{60}\text{Co}$  source of an activity between 640 and 740 GBq (rsp. 17.3 and 20.0 Ci);
4. The loading of the source into the irradiator;
5. The return transport of the loaded irradiator to CEA-Saclay.

For this provision, application of the statutory requirements and provision of the documents statutorily associated to the mentioned operations are mandatory.

## REFERENCE DOCUMENTS

- [1] Set of the ICo4F irradiator plans; CEA - ORIS-LABRA 100400000
- [2] Dossier de sécurité CLS n°297R de l’irradiateur COCASE (Réf. SACM/SECU/I218/2009/01/F1/OK)
- [3] Dossier ASN « Code de la Santé Publique » (CSP) de lot n°30 (Réf. IRFU/SACM/SECU/218/DOS/11)
- [4] Nuclear Materials Management: Dossier des « Eléments d’information et de description (EID) des installations 82 et 218 – DRF/Irfu » (Réf. IRFU/DIR/PQ/01)
- [5] Documents about radioprotection: analysis of worker exposures, reports about controls, etc.

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<sup>1</sup> **Operating site:** In this document, “operating site” defines the site (or the sites) where the loading operations will be done.

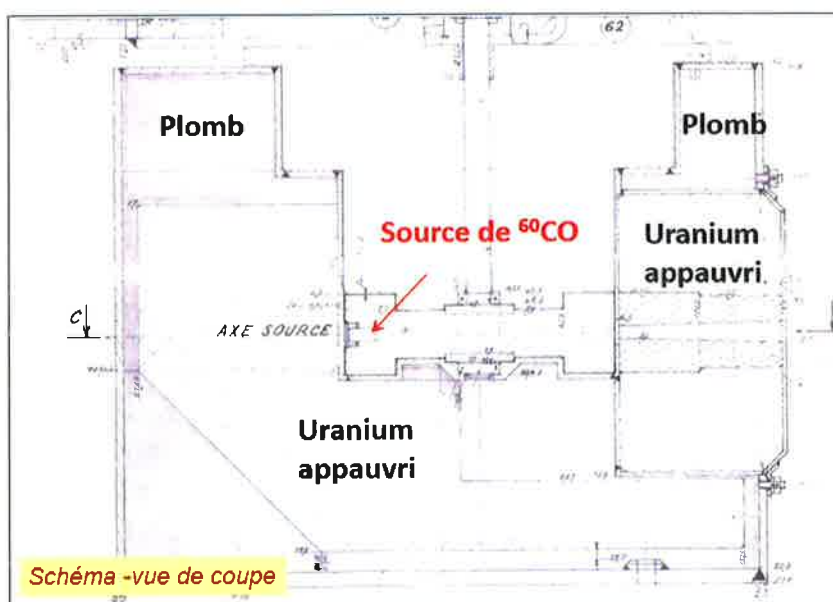
CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <p>June 2021</p>
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## 1. DESCRIPTION OF THE COCASE INSTALLATION AND OF THE ICo4F IRRADIATOR

### 1.1. THE COCASE INSTALLATION

The COCASE installation is located in the building 126 of the site of CEA PARIS-Saclay. This building belongs to the so-called "Installation 218".

Photo and sectional view of the ICo4F irradiator:



Nota: "Plomb" = lead, "Uranium appauvri" = depleted uranium

The ICo4F irradiator is a CEA apparatus. Its total weight is 345 kg. It essentially consists of a radiological protection of lead and depleted uranium. The total weight of depleted uranium is 147.1 kg.

The irradiator is described in the note "ORIS/LABRA/SGBM/R.80-0/GT" of October 1980 (in French). It is composed of a shielding in depleted uranium embedded in lead, containing a barrel in tungsten holding the source.

The barrel is put in irradiation position by a rotation of  $180^\circ$ , the source thus moving from a storage position to an irradiation position. This rotation is carried out by means of a pneumatic device controlled from outside of the installation. A lead collimator delimits a beam of radiation with a half-angle of aperture equal to approx.  $40^\circ$ . The elements to be irradiated are arranged in the beam at a distance varying according to the desired dose rate.

The mechanism of insertion or removal of the source of its housing is illustrated on the set of plans [1].

### 1.2. THE $^{60}\text{Co}$ SOURCE

The preceding  $^{60}\text{Co}$  source, unloaded in 2020, was a COG 102-type sealed source. Its dimensional characteristics were the following: overall length 13.4 mm, overall diameter 6.0 mm. Previous sources were of type COG 103-A and COG-6.

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p>
		June 2021

## 2. DETAILED DESCRIPTION OF THE REQUEST

The requested operations will be planned with the main following steps:

- **Phase 1:** Preparation of operations;
- **Phase 2:** Shipping of the empty irradiator from CEA-Paris-Saclay to the operating site;
- **Phase 3:** Provision of a new  $^{60}\text{Co}$  source;
- **Phase 4:** Loading of the irradiator by the new source;
- **Phase 5:** Return shipping of the irradiator from the operating site to CEA-Paris - Saclay.

### 2.1. PHASE 1: PREPARATION OF OPERATIONS

The holder will realise all preliminary studies needed for the operations execution:

- Participation to the writing of:
  - Prevention plan to analyse safety before doing operations;
  - Safety protocols for packaging, handling of the irradiator;
  - Analyse of intervention in radioactive area (*in French: « dossier d'intervention en milieu radioactif »: DIMR*).
- Definition of the organisation: planning, meetings, key points etc.;
- Integration of specific requirements linked with:
  - The regulation authorities;
  - The radioactive substances;
  - The radioactive materials (internal shielding contains  $^{238}\text{U}$ );
  - The transport of dangerous materials;
  - The management of exit and entrance of France of the irradiator.
- Formalisation of operating procedure for:
  - Loading, unloading and stowage of the irradiator into the container;
  - Loading unloading and stowage of the container into the vehicle;
  - Loading of the irradiator with the source;

These procedures will assure that radioactive materials will not contaminate CEA devices.
- For work at CEA Paris - Saclay, the holder will provide:
  - Classified A or B (Radioactive meaning) staff directly involved with irradiator handling;
  - Dosimeter for its staff;
  - nominative attestation ensuring that annual regularity limit will not be exceeded with this service; Medical aptitude;
  - Training certificate.

To manage nuclear materials regarding IAEA rules, the holder will provide the identity of the accounting unit of nuclear materials of the operating site.

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <p>June 2021</p>
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The holder will provide the identity of the external account or the accounting unit for nuclear materials of the operating site for, respectively, the site is submitted to declaration or permission of holding nuclear materials. This compulsory information is needed for the declaration of the variation stock report (RVS) to Euratom. In French, this document is named BDOMN (Bordereau de Déclaration d'Opération sur les Matières Nucléaires).

#### Provision of a container

For the return of the irradiator loaded with a radioactive source, CEA can provide a container ADR for type B regarding ADR rules for nuclear devices transportation (class 7). In that case, this container have to be returned to CEA after use.

The holder will propose the best cost-effective solution between a container provided by the holder and a container provided by the CEA.

#### Deliverables of phase 1:

##### Folder including:

- 📁 The planning;
- 📁 Documents requested in this paragraph: presentations, operating modes, assessments, certificates...;
- 📁 The identity of the accounting unit of nuclear materials of the operating site.

## **2.2. PHASE 2: TRANSPORT OF THE IRRADIATOR TOWARD THE OPERATING SITE**

### Packaging

The packaging of the irradiator in the container is under the holder responsibility.

*Since the irradiator is empty of radioactive source, this transport does not need the use of type A or B container.*

The CEA can supply two implements adapted to the irradiator. These implements are two wreaths, in aluminium, adapted to the top and bottom of the irradiator (see photos 1&2).



Photo.1



Photo. 2

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <hr/> <p>June 2021</p>
------------------------	--	---

The packaging will be validated by the CEA transport office of Saclay.

The irradiator will be moved by CEA in a hall equipped with a bridge crane that will allow the packaging of the irradiator into the container and the loading of the container onto the vehicle.

### Loading of the container and transportation.

Operations of loading and transportation shall not take place without the validation by CEA transport office. For that, the holder will provide a folder including loading security protocol, shipping documents, compliance of transportation implementation, etc.

#### Loading of the container onto the vehicle

The holder will load and tie up the container following an operating mode previously approved by the CEA.

#### Transportation

The holder will provide means of transportation, equipment and human, respecting ADR regulation (vehicle, driver...). Please note this transportation is under ADR UN 2909 classification.

All incident occurring during transportation phase will be bring to CEA as soon as possible.

#### Nota:

- CEA task: regulatory radiological tests done on the container and the vehicle by the radioprotection department of CEA.
- CEA task: in case the operating site is outside Europe (CE), custom formalities will be done by the CEA's forwarder:  
GONDRAND LES ULIS, 8 avenue du Parana, zone artisanale de Courtabœuf, F-91952 LES ULIS CEDEX

#### Means deployed

The CEA will make a bridge crane available to the holder for packaging and loading operation. The holder will provide a bridge-slinger having a class B radiological categorization.

The holder will also provide his sling for the irradiation and container handling.

#### Deliverables of phase 2:

- ✚ Transportation folder;
- ✚ Shipping memorandum attesting the incoming of the container by the operating site;
- ✚ Sending of the BDOMN (Euratom variation stock report - RVS) by the accountant of nuclear materials of the operating site to the accountant of CEA, without delay after destination site arrival

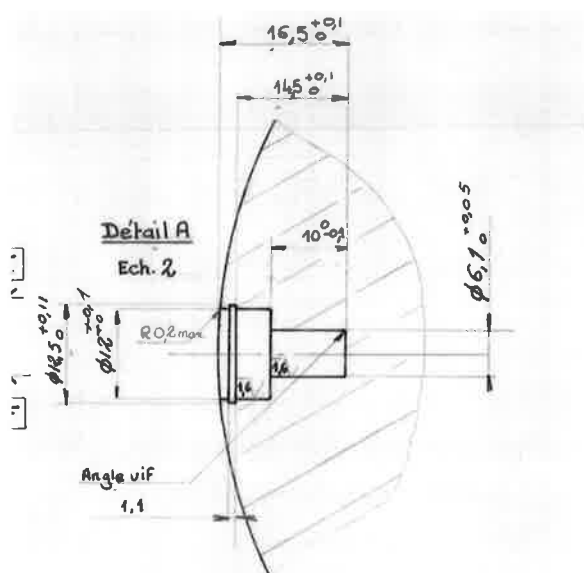


CEA SACLAY DRF/Irfu	<u>Specification</u> Loading of the COCASE irradiator by a sealed $^{60}\text{Co}$ source	Réf: Irfu/DIR/CDC/02 Indice A
		June 2021

### 2.3. PHASE 3: PROVISION OF A $^{60}\text{Co}$ SOURCE

The source to be loaded should be a  $^{60}\text{Co}$  special-form-sealed source with an activity between 17.3 and 20.0 Ci (i.e. between 640 and 740 GBq). Its dimensions should be compatible with the ICO4F barrel dimensions, (see the following figure). For information, the preceding source was a  $^{60}\text{Co}$  pellet in double stainless steel capsule type COG-102 with an initial activity of 641,7 GBq (17,3 Ci), with an overall length of 13.4 mm and an overall diameter of 6.0 mm. The holder can propose another type of source, or approach of reloading, provided it does not compromise the agreement of the ICO4F irradiator.

The holder commits to take over the source at the end of its life.



#### Deliverables of phase 3:

- ➡ Source certificate
- ➡ Source taking over signed and dated commitment

### 2.4. PHASE 4: LOADING OF THE IRRADIATOR WITH THE SOURCE

The holder will apply at operating site the operating procedure for the loading of the irradiator with the source as defined during phase 1.

### 2.5. PHASE 4: TRANSPORT OF THE LOADED IRRADIATOR FROM OPERATING SITE TO CEA-SACLAY

Operation relative to the transport (packaging, loading and transport) are under holder responsibility. The holder will provide to transportation office of CEA the following documents: loading security protocol, shipping documents, conformity of tools used for the transportation, etc.

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <math>^{60}\text{Co}</math> source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <hr/> <p>June 2021</p>
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### Packaging

Before package the irradiator, the holder will perform a radiological control of the irradiator to assure that the irradiator was not contaminated during operations on the site.

The holder will provide a shipping container adapted and conform to ADR regulation.

If used for the outward journey, the CEA implements will be use for the return packaging. In any case, these implements have to be given back to CEA.

### Loading of the container and transportation

#### Loading of the container on the vehicle

The loading and the stowage of the container are under the holder responsibility. These operations will be done following security protocol and operating modes defined previously.

#### Transportation

The holder will provide means of transportation, equipment and human, respecting ADR regulation (vehicle, driver...).

All incident occurring during transportation phase will be bring to CEA as soon as possible.

#### Nota:

- In case the operating site is outside Europe (CE), custom formalities will be done by the CEA's forwarder: GONDRAND LES ULIS, 8 avenue du Parana, zone artisanale de Courtabœuf, F-91952 LES ULIS CEDEX

### Unloading of the container

The holder will unload the container at CEA Saclay, building 126, with the operating mode previously defined.

The unloading of the container and the unpacking of the irradiator are under the holder responsibility. These operations will be done following security protocol and operating modes defined previously.

After the unpacking, the CEA will take in charge the irradiator to move it until its bunker.

#### Delivrables of phase 5:

- ✚ Transport folder (shipment statement, loading security protocol, etc.);
- ✚ Report of radiological test before shipping;
- ✚ Sending of the BDOMN (Euratom variation stock report - RVS) by the accountant of nuclear materials of the operating site to the accountant of CEA, the day of departure, without delay.

CEA SACLAY DRF/Irfu	<p style="text-align: center;"><u>Specification</u></p> <p style="text-align: center;">Loading of the COCASE irradiator by a sealed <sup>60</sup>Co source</p>	<p>Réf: Irfu/DIR/CDC/02 Indice A</p> <p>June 2021</p>
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### 3. VALIDATION TESTS AT CEA-SACLAY

Validation tests will be running by CEA at CEA-Saclay to verify the proper functioning of the irradiator source. The successful completion of these tests will allow the acceptance of the irradiator.

### 4. DOCUMENTS AND INFORMATIONS TO RETURN WITH THE OFFER

Particularly for this service, the holder will provide presentations and documents requested in this specification.

Furthermore, following documents and/or information have to be given with the offer:

- Certificate of staff to work in a radioactive ambiance (or equivalent to the French *CEFRI certificate*)
- Certificate of the company(ies) for the management of works in a radioactive ambiance (or equivalent to the French *CEFRI certificate*)
- The copy of authorizations for the holder and/or its potential subcontractors with regard to:
  - o The licence from the national security authority of the operating site to operate unloading of the source as described in this specification,
  - o The licence relative to the production, detention and transportation of radioactive sources and nuclear materials.
- A description of the operating site and facility (localization, activities...).

### 5. CEA REPRESENTATIVES

#### Technical contacts:

- Rémi CHIPAUX – CEA/DRF/Irfu/DEDIP/Operating manager & Nuclear material follower (ACSP) of COCASE facility – tel +33 1 69 08 95 68; remi.chipaux@cea.fr
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