Thoughts of
the assembly process

8 February 2021

Tsunayuki Matsubara

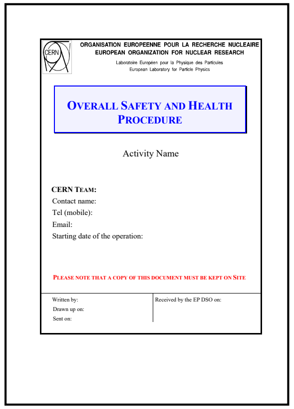
Thoughts of assembly process

What we would like to investigate with the assembly process:

- Efficient works (e.g. Preparations, Space arrangement, Worker's manual, Work timeline)
- Safety (Risk analysis, Countermeasure, Documentation to the facility)
- Person power (On-site manger, Expertise, Part time by JPN contractors?)
- Support by the facility (Shipment, Storage, Contractor's work)
- Detector checks in each stage (QC, QA, Commissioning)
- Interference with other works in the NA/NM buildings

Ref.) Document required by CERN

PPSPS Form



ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
Laboratoire Européen pour la Physique des Particules
European Laboratory for Particle Physics

OVERALL SAFETY AND HEALTH PROCEDURE

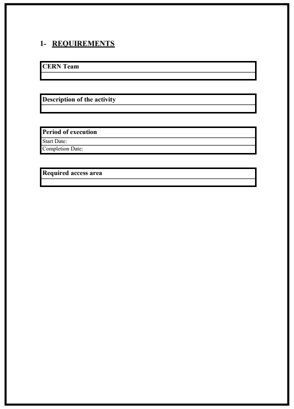
Activity Name

CERN TEAM:
Contact name:
Tel (mobile):
Email:
Starting date of the operation:

PLEASE NOTE THAT A COPY OF THIS DOCUMENT MUST BE KEPT ON SITE

Written by:
Drawn up on:
Sent on:

Received by the EP DSO on:



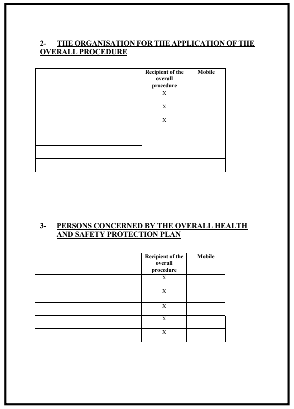
1- **REQUIREMENTS**

CERN Team

Description of the activity

Period of execution
Start Date:
Completion Date:

Required access area

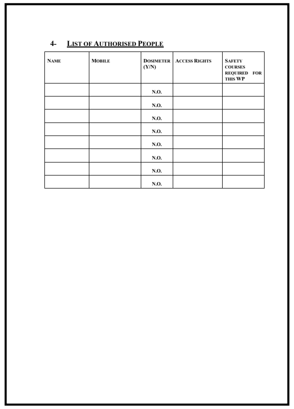


2- **THE ORGANISATION FOR THE APPLICATION OF THE OVERALL PROCEDURE**

	Recipient of the overall procedure	Mobile
	X	
	X	
	X	

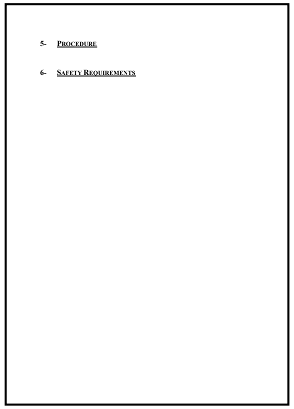
3- **PERSONS CONCERNED BY THE OVERALL HEALTH AND SAFETY PROTECTION PLAN**

	Recipient of the overall procedure	Mobile
	X	
	X	
	X	
	X	
	X	



4- **LIST OF AUTHORISED PEOPLE**

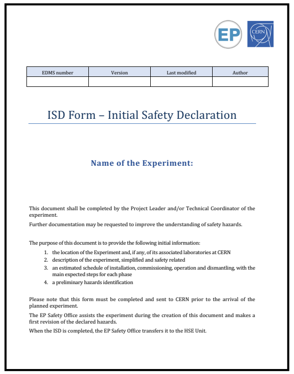
NAME	MOBILE	DOSIMETER (Y/N)	ACCESS RIGHTS	SAFETY COURSES REQUIRED FOR THIS WP
		N.O.		
		N.O.		
		N.O.		
		N.O.		
		N.O.		
		N.O.		
		N.O.		
		N.O.		



5- **PROCEDURE**

6- **SAFETY REQUIREMENTS**

ISD Form



EDMS number	Version	Last modified	Author

ISD Form – Initial Safety Declaration

Name of the Experiment:

This document shall be completed by the Project Leader and/or Technical Coordinator of the experiment.

Further documentation may be requested to improve the understanding of safety hazards.

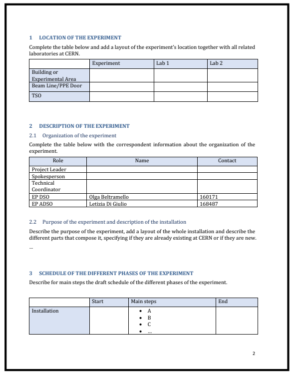
The purpose of this document is to provide the following initial information:

1. the location of the Experiment and, if any, of its associated laboratories at CERN
2. description of the experiment, simplified and safety related
3. an estimated schedule of installation, commissioning, operation and dismantling, with the main expected steps for each phase
4. a preliminary hazards identification

Please note that this form must be completed and sent to CERN prior to the arrival of the planned experiment.

The EP Safety Office assists the experiment during the creation of this document and makes a first revision of the declared hazards.

When the ISD is completed, the EP Safety Office transfers it to the HSE Unit.



1 LOCATION OF THE EXPERIMENT

Complete the table below and add a layout of the experiment's location together with all related laboratories at CERN.

	Experiment	Lab 1	Lab 2
Building or Experimental Area			
Beam Line/PPE Door			
TSO			

2 DESCRIPTION OF THE EXPERIMENT

2.1 Organization of the experiment

Complete the table below with the correspondent information about the organization of the experiment.

Role	Name	Contact
Project Leader		
Spokesperson		
Technical Coordinator		
EP DSO	Olga Beltramello	160171
EP ADSO	Letizia Di Giulio	168487

2.2 Purpose of the experiment and description of the installation

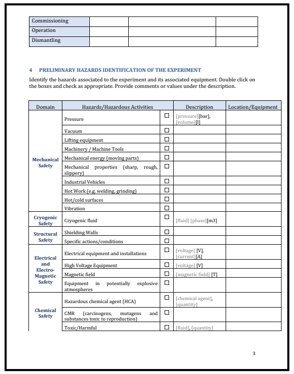
Describe the purpose of the experiment, add a layout of the whole installation and describe the different parts that compose it, specifying if they are already existing at CERN or if they are new.

…

3 SCHEDULE OF THE DIFFERENT PHASES OF THE EXPERIMENT

Describe for main steps the draft schedule of the different phases of the experiment.

	Start	Main steps	End
Installation		• A • B • C • …	

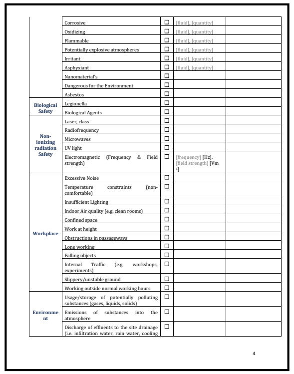


Commissioning			
Operation			
Dismantling			

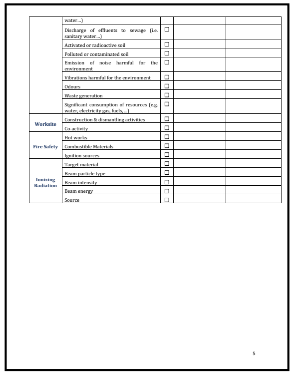
4 PRELIMINARY HAZARDS IDENTIFICATION OF THE EXPERIMENT

Identify the hazards associated to the experiment and its associated equipment. Double click on the boxes and check as appropriate. Provide comments or values under the description.

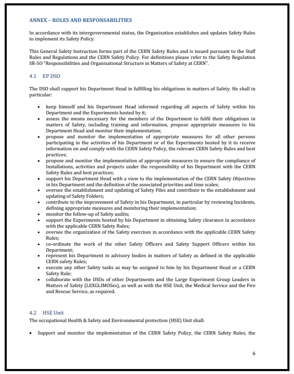
Domain	Hazards/Hazardous Activities		Description	Location/Equipment
Mechanical Safety	Pressure	☐	[pressure][bar], [volume][l]	
	Vacuum	☐		
	Lifting equipment	☐		
	Machinery / Machine Tools	☐		
	Mechanical energy (moving parts)	☐		
	Mechanical properties (sharp, rough, slippery)	☐		
	Industrial Vehicles	☐		
	Hot Work (e.g. welding, grinding)	☐		
	Hot/cold surfaces	☐		
	Vibration	☐		
Cryogenic Safety	Cryogenic fluid	☐	[fluid] [phase][m3]	
Structural Safety	Shielding Walls	☐		
	Specific actions/conditions	☐		
Electrical and Electro-Magnetic Safety	Electrical equipment and installations	☐	[voltage] [V], [current][A]	
	High Voltage Equipment	☐	[voltage] [V]	
	Magnetic field	☐	[magnetic field] [T]	
	Equipment in potentially explosive atmospheres	☐		
Chemical Safety	Hazardous chemical agent (HCA)	☐	[chemical agent], [quantity]	
	CMR (carcinogens, mutagens and substances toxic to reproduction)	☐		
	Toxic/Harmful	☐	[fluid], [quantity]	



	Corrosive	☐	[fluid], [quantity]	
	Oxidizing	☐	[fluid], [quantity]	
	Flammable	☐	[fluid], [quantity]	
	Potentially explosive atmospheres	☐	[fluid], [quantity]	
	Irritant	☐	[fluid], [quantity]	
	Asphyxiant	☐	[fluid], [quantity]	
	Nanomaterial's	☐		
	Dangerous for the Environment	☐		
	Asbestos	☐		
Biological Safety	Legionella	☐		
	Biological Agents	☐		
Non-ionizing radiation Safety	Laser, class	☐		
	Radiofrequency	☐		
	Microwaves	☐		
	UV light	☐		
	Electromagnetic (Frequency & Field strength)	☐	[frequency] [Hz], [field strength] [Vm-1]	
Workplace	Excessive Noise	☐		
	Temperature constraints (non-comfortable)	☐		
	Insufficient Lighting	☐		
	Indoor Air quality (e.g. clean rooms)	☐		
	Confined space	☐		
	Work at height	☐		
	Obstructions in passageways	☐		
	Lone working	☐		
	Falling objects	☐		
	Internal Traffic (e.g. workshops, experiments)	☐		
	Slippery/unstable ground	☐		
	Working outside normal working hours	☐		
Environment	Usage/storage of potentially polluting substances (gases, liquids, solids)	☐		
	Emissions of substances into the atmosphere	☐		
	Discharge of effluents to the site drainage (i.e. infiltration water, rain water, cooling	☐		



	water…)			
	Discharge of effluents to sewage (i.e. sanitary water…)	☐		
	Activated or radioactive soil	☐		
	Polluted or contaminated soil	☐		
	Emission of noise harmful for the environment	☐		
	Vibrations harmful for the environment	☐		
	Odours	☐		
	Waste generation	☐		
	Significant consumption of resources (e.g. water, electricity gas, fuels, …)	☐		
Worksite	Construction & dismantling activities	☐		
	Co-activity	☐		
Fire Safety	Hot works	☐		
	Combustible Materials	☐		
	Ignition sources	☐		
Ionizing Radiation	Target material	☐		
	Beam particle type	☐		
	Beam intensity	☐		
	Beam energy	☐		
	Source	☐		



ANNEX – ROLES AND RESPONSABILITIES

In accordance with its intergovernmental status, the Organization establishes and updates Safety Rules to implement its Safety Policy.

This General Safety Instruction forms part of the CERN Safety Rules and is issued pursuant to the Staff Rules and Regulations and the CERN Safety Policy. For definitions please refer to the Safety Regulation SR-SO "Responsibilities and Organisational Structure in Matters of Safety at CERN".

4.1 EP DSO

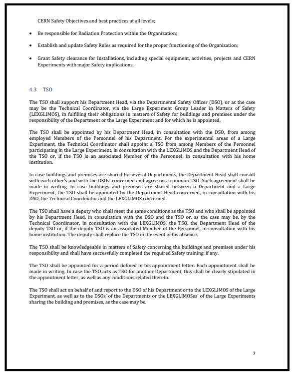
The DSO shall support his Department Head in fulfilling his obligations in matters of Safety. He shall in particular:

- keep himself and his Department Head informed regarding all aspects of Safety within his Department and the Experiments hosted by it;
- assess the means necessary for the members of the Department to fulfil their obligations in matters of Safety, including training and information, propose appropriate measures to his Department Head and monitor their implementation;
- propose and monitor the implementation of appropriate measures for all other persons participating in the activities of his Department or of the Experiments hosted by it to receive information on and comply with the CERN Safety Policy, the relevant CERN Safety Rules and best practices;
- propose and monitor the implementation of appropriate measures to ensure the compliance of Installations, activities and projects under the responsibility of his Department with the CERN Safety Rules and best practices;
- support his Department Head with a view to the implementation of the CERN Safety Objectives in his Department and the definition of the associated priorities and time scales;
- oversee the establishment and updating of Safety Files and contribute to the establishment and updating of Safety Folders;
- contribute to the improvement of Safety in his Department, in particular by reviewing Incidents, defining appropriate measures and monitoring their implementation;
- monitor the follow-up of Safety audits;
- support the Experiments hosted by his Department in obtaining Safety clearance in accordance with the applicable CERN Safety Rules;
- oversee the organization of the Safety exercises in accordance with the applicable CERN Safety Rules;
- co-ordinate the work of the other Safety Officers and Safety Support Officers within his Department;
- represent his Department in advisory bodies in matters of Safety as defined in the applicable CERN safety Rules;
- execute any other Safety tasks as may be assigned to him by his Department Head or a CERN Safety Rule;
- collaborate with the DSOs of other Departments and the Large Experiment Group Leaders in Matters of Safety (LEXGLIMOSes), as well as with the HSE Unit, the Medical Service and the Fire and Rescue Service, as required.

4.2 HSE Unit

The occupational Health & Safety and Environmental protection (HSE) Unit shall:

- Support and monitor the implementation of the CERN Safety Policy, the CERN Safety Rules, the



CERN Safety Objectives and best practices at all levels;

- Be responsible for Radiation Protection within the Organization;
- Establish and update Safety Rules as required for the proper functioning of the Organization;
- Grant Safety clearance for Installations, including special equipment, activities, projects and CERN Experiments with major Safety implications.

4.3 TSO

The TSO shall support his Department Head, via the Departmental Safety Officer (DSO), or as the case may be the Technical Coordinator, via the Large Experiment Group Leader in Matters of Safety (LEXGLIMOS), in fulfilling their obligations in matters of Safety for buildings and premises under the responsibility of the Department or the Large Experiment and for which he is appointed.

The TSO shall be appointed by his Department Head, in consultation with the DSO, from among employed Members of the Personnel of his Department. For the experimental areas of a Large Experiment, the Technical Coordinator shall appoint a TSO from among Members of the Personnel participating in the Large Experiment, in consultation with the LEXGLIMOS and the Department Head of the TSO or, if the TSO is an associated Member of the Personnel, in consultation with his home institution.

In case buildings and premises are shared by several Departments, the Department Head shall consult with each other's and with the DSOs' concerned and agree on a common TSO. Such agreement shall be made in writing. In case buildings and premises are shared between a Department and a Large Experiment, the TSO shall be appointed by the Department Head concerned, in consultation with his DSO, the Technical Coordinator and the LEXGLIMOS concerned.

The TSO shall have a deputy who shall meet the same conditions as the TSO and who shall be appointed by his Department Head, in consultation with the DSO and the TSO or, as the case may be, by the Technical Coordinator, in consultation with the LEXGLIMOS, the TSO, the Department Head of the deputy TSO or, if the deputy TSO is an associated Member of the Personnel, in consultation with his home institution. The deputy shall replace the TSO in the event of his absence.

The TSO shall be knowledgeable in matters of Safety concerning the buildings and premises under his responsibility and shall have successfully completed the required Safety training, if any.

The TSO shall be appointed for a period defined in his appointment letter. Each appointment shall be made in writing. In case the TSO acts as TSO for another Department, this shall be clearly stipulated in the appointment letter, as well as any conditions related thereto.

The TSO shall act on behalf of and report to the DSO of his Department or to the LEXGLIMOS of the Large Experiment, as well as to the DSOs' of the Departments or the LEXGLIMOSes' of the Large Experiments sharing the building and premises, as the case may be.

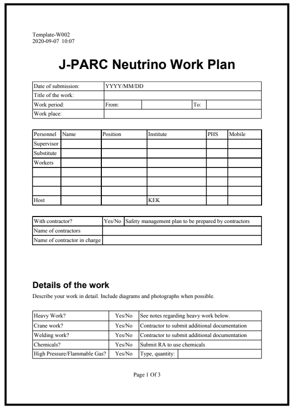
+Work schedule

Ref.) Document required by J-PARC

ND280 Safety committee, Type of work

https://www.t2k.org/comm/sc

Work plan form



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J-PARC Neutrino Work Plan

Date of submission:	YYYY/MM/DD		
Title of the work:			
Work period:	From:	To:	
Work place:			

Personnel	Name	Position	Institute	PHS	Mobile
Supervisor					
Substitute					
Workers					
Host			KEK		

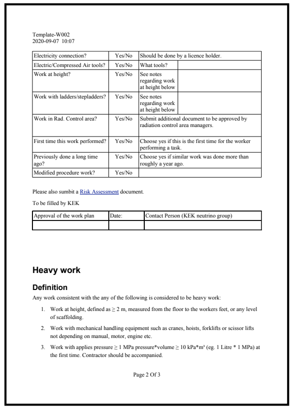
With contractor?	Yes/No	Safety management plan to be prepared by contractors
Name of contractors		
Name of contractor in charge		

Details of the work

Describe your work in detail. Include diagrams and photographs when possible.

Heavy Work?	Yes/No	See notes regarding heavy work below.	
Crane work?	Yes/No	Contractor to submit additional documentation	
Welding work?	Yes/No	Contractor to submit additional documentation	
Chemicals?	Yes/No	Submit RA to use chemicals	
High Pressure/Flammable Gas?	Yes/No	Type, quantity:	

Page 1 Of 3



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Electricity connection?	Yes/No	Should be done by a licence holder.	
Electric/Compressed Air tools?	Yes/No	What tools?	
Work at height?	Yes/No	See notes regarding work at height below	
Work with ladders/stepladders?	Yes/No	See notes regarding work at height below	
Work in Rad. Control area?	Yes/No	Submit additional document to be approved by radiation control area managers.	
First time this work performed?	Yes/No	Choose yes if this is the first time for the worker performing a task.	
Previously done a long time ago?	Yes/No	Choose yes if similar work was done more than roughly a year ago.	
Modified procedure work?	Yes/No		

Please also sumbit a Risk Assessment document.

To be filled by KEK

Approval of the work plan	Date:	Contact Person (KEK neutrino group)

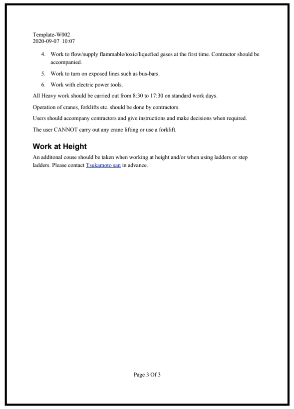
Heavy work

Definition

Any work consistent with the any of the following is considered to be heavy work:

1. Work at height, defined as ≥ 2 m, measured from the floor to the workers feet, or any level of scaffolding.
2. Work with mechanical handling equipment such as cranes, hoists, forklifts or scissor lifts not depending on manual, motor, engine etc.
3. Work with applies pressure ≥ 1 MPa pressure*volume ≥ 10 kPa*m^3 (eg. 1 Litre * 1 MPa) at the first time. Contractor should be accompanied.

Page 2 Of 3



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4. Work to flow/supply flammable/toxic/liquefied gases at the first time. Contractor should be accompanied.
5. Work to turn on exposed lines such as bus-bars.
6. Work with electric power tools.

All Heavy work should be carried out from 8:30 to 17:30 on standard work days.

Operation of cranes, forklifts etc. should be done by contractors.

Users should accompany contractors and give instructions and make decisions when required.

The user CANNOT carry out any crane lifting or use a forklift.

Work at Height

An additonal couse should be taken when working at height and/or when using ladders or step ladders. Please contact Tsukamoto san in advance.

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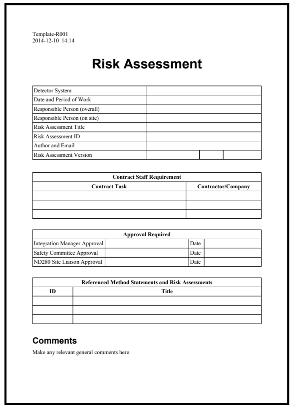
Risk assessment form



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Risk Assessment

Detector System			
Date and Period of Work			
Responsible Person (overall)			
Responsible Person (on site)			
Risk Assessment Title			
Risk Assessment ID			
Author and Email			
Risk Assessment Version			

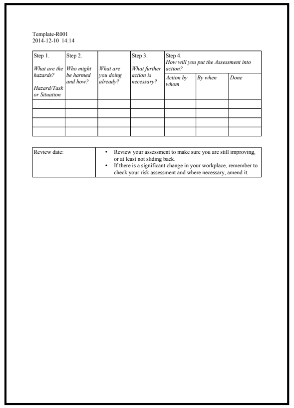
Contract Staff Requirement	
Contract Task	**Contractor/Company**

Approval Required			
Integration Manager Approval		Date	
Safety Committee Approval		Date	
ND280 Site Liaison Approval		Date	

Referenced Method Statements and Risk Assessments	
ID	**Title**

Comments

Make any relevant general comments here.



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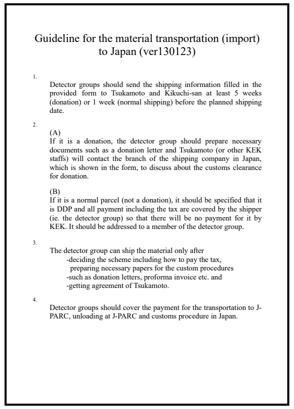
Step 1. *What are the hazards?* *Hazard/Task or Situation*	Step 2. *Who might be harmed and how?*	*What are you doing already?*	Step 3. *What further action is necessary?*	Step 4. *How will you put the Assessment into action?*		
				Action by whom	*By when*	*Done*

Review date:	• Review your assessment to make sure you are still improving, or at least not sliding back. • If there is a significant change in your workplace, remember to check your risk assessment and where necessary, amend it.

Guideline to transport to J-PARC

https://www.t2k.org/nd280/facility/applicationforms



Guideline for the material transportation (import) to Japan (ver130123)

1\.

Detector groups should send the shipping information filled in the provided form to Tsukamoto and Kikuchi-san at least 5 weeks (donation) or 1 week (normal shipping) before the planned shipping date.

2\.

(A)
If it is a donation, the detector group should prepare necessary documents such as a donation letter and Tsukamoto (or other KEK staffs) will contact the branch of the shipping company in Japan, which is shown in the form, to discuss about the customs clearance for donation.

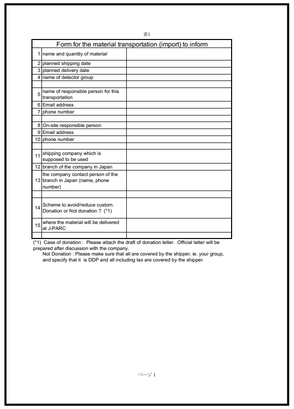
(B)
If it is a normal parcel (not a donation), it should be specified that it is DDP and all payment including the tax are covered by the shipper (ie. the detector group) so that there will be no payment for it by KEK. It should be addressed to a member of the detector group.

3\.

The detector group can ship the material only after
-deciding the scheme including how to pay the tax,
preparing necessary papers for the custom procedures
-such as donation letters, proforma invoice etc. and
-getting agreement of Tsukamoto.

4\.

Detector groups should cover the payment for the transportation to J-PARC, unloading at J-PARC and customs procedure in Japan.



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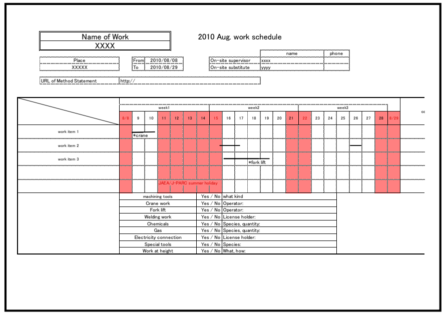
Form for the material transportation (import) to inform		
1	name and quantity of material	
2	planned shipping date	
3	planned delivery date	
4	name of detector group	
5	name of responsible person for this transportation	
6	Email address	
7	phone number	
8	On-site responsible person	
9	Email address	
10	phone number	
11	shipping company which is supposed to be used	
12	branch of the company in Japan	
13	the company contact person of the branch in Japan (name, phone number)	
14	Scheme to avoid/reduce custom. Donation or Not donation ? (*1)	
15	where the material will be delivered at J-PARC	

(*1) Case of donation : Please attach the draft of donation letter. Official letter will be prepared after discussion with the company.
Not Donation : Please make sure that all are covered by the shipper, ie. your group, and specify that it is DDP and all including tax are covered by the shipper.

ページ1

Work schedule form



Name of Work
XXXX

2010 Aug. work schedule

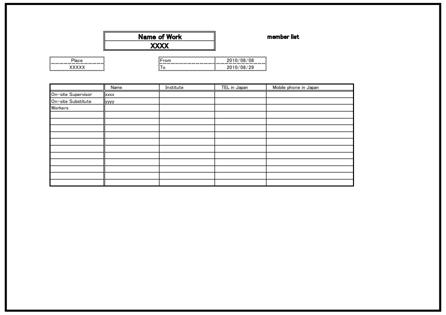
Place	From	2010/08/08
XXXXX	To	2010/08/29

	name	phone
On-site supervisor	xxxx	
On-site substitute	yyyy	

URL of Method Statement	http://

	week1							week2							week3								co
	8/8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	8/29	
work item 1		*crane																					
work item 2																							
work item 3											*fork lift												
				JAEA/J-PARC summer holiday																			

machining tools	Yes / No	what kind
Crane work	Yes / No	Operator:
Fork lift	Yes / No	Operator:
Welding work	Yes / No	License holder:
Chemicals	Yes / No	Species, quantity:
Gas	Yes / No	Species, quantity:
Electricity connection	Yes / No	License holder:
Special tools	Yes / No	Species:
Work at height	Yes / No	What, how:



Name of Work
XXXX

member list

Place	From	2010/08/08
XXXXX	To	2010/08/29

	Name	Institute	TEL in Japan	Mobile phone in Japan
On-site Supervisor	xxxx			
On-site Substitute	yyyy			
Workers				

Ref.) Questions about contractor’s work

(from Tsukamoto-san)

(4) sFGD Truck unloading

- I think the wooden box is supposed to be disassembled after unloading.
- Is the platform assembling supposed to be asked to a contractor ?

(5) sFGD installation

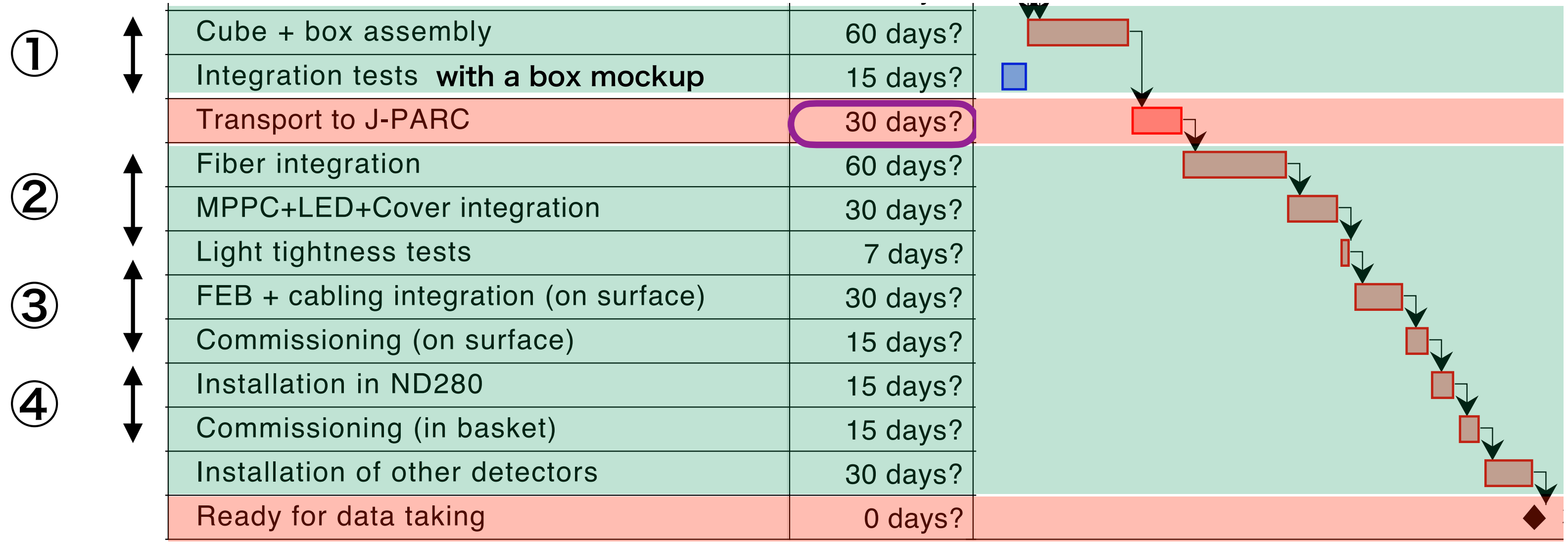
- "Crane is also necessary to lower the front-end electronics crates for two sides. " --> Does this mean that front-end electronics lowering is supposed to be asked to a contractor ?

(6) general requests

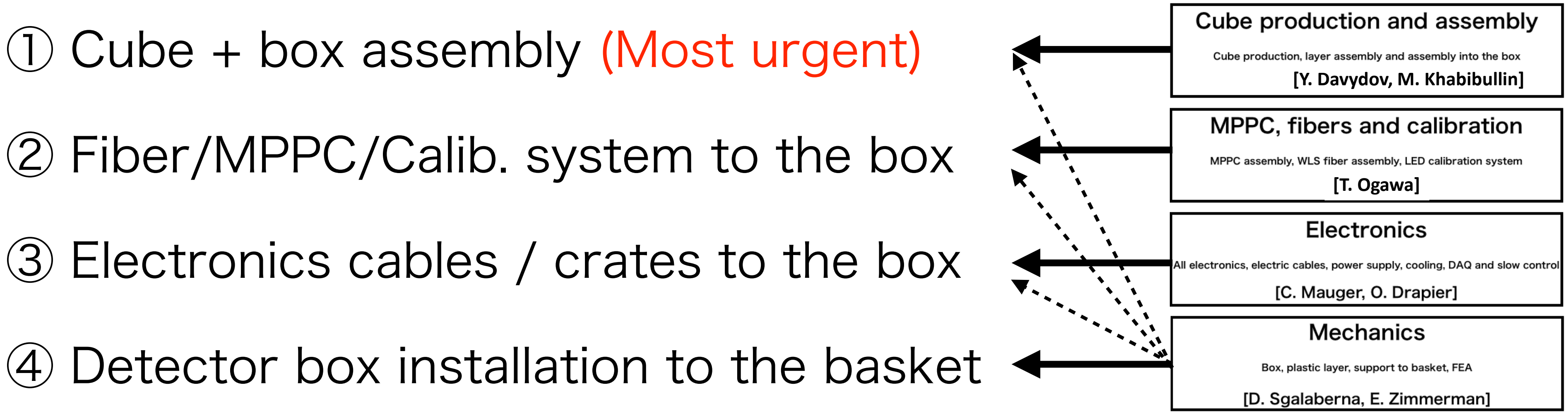
Shall I ask you for cartoons/slides/pictures which can help/show us to understand/know some details which cannot be explained by texts only ?

Ref.) Integration timeline

We still do not know the reasonable timeline for the integration



①	Cube + box assembly	60 days?
	Integration tests **with a box mockup**	15 days?
	Transport to J-PARC	30 days?
②	Fiber integration	60 days?
	MPPC+LED+Cover integration	30 days?
	Light tightness tests	7 days?
③	FEB + cabling integration (on surface)	30 days?
	Commissioning (on surface)	15 days?
④	Installation in ND280	15 days?
	Commissioning (in basket)	15 days?
	Installation of other detectors	30 days?
	Ready for data taking	0 days?



① Cube + box assembly (Most urgent)

② Fiber/MPPC/Calib. system to the box

③ Electronics cables / crates to the box

④ Detector box installation to the basket

Cube production and assembly
Cube production, layer assembly and assembly into the box
[Y. Davydov, M. Khabibullin]

MPPC, fibers and calibration
MPPC assembly, WLS fiber assembly, LED calibration system
[T. Ogawa]

Electronics
All electronics, electric cables, power supply, cooling, DAQ and slow control
[C. Mauger, O. Drapier]

Mechanics
Box, plastic layer, support to basket, FEA
[D. Sgalaberna, E. Zimmerman]

① Cube + box assembly

It's just my initial thoughts

— Shipment / storage
— Heavy equipment
— Assembly work
— Detector check

-- 2021.11? ~ 2022.1? --

- Preparation for the cube+box assembly
- (Receipt) Unloading of the platform, Assembly stand, Transport box, Box parts (Forklift)
- Preparation of lifting structure? (Crane?)
- Preparation of tools like tyvek, screws, lightning, anti-dust cover, helmets, gloves, etc...?
- Platform assembly (Crane?)
- Assembly stand assembly
- Workbench assembly
- Arrangement of space (Crane & Forklift?)
- (Receipt) Unloading of the first 3 plates (Forklift?)
- Box 3 plates assembly
- (Receipt) Unloading of the last 3 plates (Forklift?)

Seismic point is the main issue left for the decision of assembly place. (CERN or Japan)
→ the most urgent issue

- Cube+box assembly --> Procedure to be clarified
- Layer-by-layer assembly with the platform movement
  (QC/QA) Take pictures from top and two sides to check quality later if necessary
  (QC/QA) Height measurement to check the hole alignment if useful
  (QC/QA) Box closure test during the assembly work before the last 3 plates delivery?
- Box closure of side plates
- Soft form layer installation
- Box closure of top plate (Crane?)
- Bracket attachment
- Clean-up of the unnecessary materials. Disposal or storage (Forklift?)

② Fiber / MPPC / Calib. system to the box

— Shipment / storage
— Heavy equipment
— Assembly work
— Detector check

It’s just my initial thoughts

-- 2022.2? ~ 2022.5? --

- Preparation for the next step
- (Receipt) Loading of another assembly stand (Forklift)
- Box fixation to the new assembly stand (Crane)
  (QC/QA) Box deformation measurement?
- Arrangement of space (Crane, Forklift or Chill roller?)
- (Receipt) Loading fiber containers, MPP64-PCBs and calibration modules.
- Preparation of tools like screws, screw drivers, helmet, gloves, black sheets, etc...
- Preparation of the quick QC system
- Preparation of the safety equipment to work under the box

- Integration of the fiber, MPPC64-PCBs & calib. modules [2]
--> Procedure to be clarified
- Fiber insertion with softform, removing fishing lines and metal rods.
- Fiber cut after the insertion
  (QC/QA) Quick QC of fiber during the insertion work with dedicated setup
- Insertion of the alignment pins for the MPPC64-PCB
- MPPC64-PCB attachment for the area where the QC is performed
  (QC/QA) Serial numbers should be managed to keep tracking.
  (QC/QA) Quick QC for all fibers & MPPC64-PCBs after mounting all channels
- Calibration system attachment
  (QC/QA) Test of calibration module after the attachment
- Light tightness
  (QC/QA) Quick check of the light tightness
- Cabling of the calibration system
- Clean-up of the unnecessary materials. Disposal or storage. (Forklift?)

③ Electronics cables / crates to the box

It's just my initial thoughts

— Shipment / storage
— Heavy equipment
— Assembly work
— Detector check

-- 2022.6? ~ 2022.7? --

- Preparation for the next step
- (Receipt) Loading two sets of integrated crates elec. modules, cables and so on (Forklift?)
- (QC/QA) Evaluation test of FEBs at J-PARC before mounting on surface
- Preparation of the commissioning like DAQ PCs

- Integration of Electronics cabling crate mounting [3] --> Procedure to be clarified
- Cabling on the box surface up to the MIB
- Mounting of two sets of the integrated crates to the assembly stand (Crane?)
- Cable slack management
- Installation of Backend, FEB, Voltage module
- (Cooling pipe connection is not necessary?)
- DAQ connection for the commissioning on surface
- (QC/QA) Commissioning for all channels with the LED calibration system
- (QC/QA) Commissioning with cosmics. External trigger? Self trigger?
- Detaching of the crate and temporal cable bundling for installation (Crane?)
- Clean-up of the unnecessary materials. Disposal or storage. (Forklift?)

④ Detector box installation to the basket

It’s just my initial thoughts

— Shipment / storage
— Heavy equipment
— Assembly work
— Detector check

-- 2022.8? ~ 2022.9? ---------------------------------------

- **Preparation**
  - (Receipt) Unloading of the lifter?, guide rail, cooling pipe, cables, etc…
  - (QC/QA) Measurement of the modified basket? Should be done in advance if possible
  - Setting guide rail to the basket if necessary?
  - Consultation with contactor for the installation work
  - Q. How about the work at the SS floor?

- **Installation [4]** --> Procedure to be clarified
  - Transport on the surface with the stand (Crane truck or Chill roller? (Less vibration?))
  - Detaching from the stand and down to the pit (Crane at NM building)
  - Fixing the box to the basket
  - Hoist ring removal?
  - (QC/QA) Measurement of the envelope after the installation for a record (sim. input?)
  - Installation of the electronics crate to the basket
  - Cooling pipe connections
  - Various cable connections
  - (QC/QA) Commissioning for all channels with the LED calibration system
  - (QC/QA) Commissioning with cosmics. External trigger? Self trigger?
  - Repair work if necessary? (Crane, Crane truck or Chill roller?)
  - Clean-up of the unnecessary materials. Disposal or storage (Forklift?)