

# **Guidelines for applying to the “Project of Decommissioning and Contaminated Water Management (Conceptual Study of Innovative Approach for Fuel Debris Retrieval and Feasibility Study of Essential Technologies)” in the FY2013 Supplementary Budget**

Date: June 27, 2014  
Management Office for the Project of Decommissioning  
and Contaminated Water Management

The Management Office for the Project of Decommissioning and Contaminated Water Management has opened the RFP (Request for Proposal) call for entities to receive subsidies and implement the “Project of Decommissioning and Contaminated Water Management (Conceptual Study of Innovative Approach for Fuel Debris Retrieval and Feasibility Study of Essential Technology)” in the FY2013 supplementary budget. All applicants are also advised to read the relevant grant policy carefully.

## 1. Purpose of this Project

As the fuel retrieval from the spent fuel pool at Fukushima Daiichi NPS Unit 4 started on November 18, 2013, “Mid- and Long-term Roadmap for Decommissioning at Units 1 to 4 of Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company” (hereinafter called “mid- and long-term roadmap”) proceeded to the next (second) phase. The goal of the second phase is to start retrieving fuel debris from inside the primary containment vessels and the reactor pressure vessels at Fukushima Daiichi NPS Unit 1 to Unit 3 from 2020 and therefore the immediate execution of necessary on-site operation and related research and development are required. Based on the experience of working on the Three Mile Island Nuclear Power Plant Unit 2 (TMI-2) accident, we are currently considering conducting the submersion approach, which would place the primary containment vessels in water to use the shielding effect of water. In addition to the research and the maintenance technologies for submerging primary containment vessels, the research and development for retrieving, placing and storing fuel debris will be conducted.

At the same time, as the primary containment vessels at Unit 1 to Unit 3 were severely affected by the accident, the boundary functions may be damaged and the fuel debris may have fallen outside the pressure vessels. Therefore, the procedures for retrieving debris may be much more complicated than those for TMI-2. So we assume that it may be difficult to submerge to a sufficient level to cover the upper part of the primary containment vessels and the deposition of the fuel debris. As a result, the revised mid-term roadmap dated June 27, 2013 clearly stated the commencement of the innovative approach for fuel debris retrieval without submerging, in addition to the existing course.

Under such circumstances, the Technological Research Association of the International Research Institute for Nuclear Decommissioning (hereinafter called “IRID”) was founded on August 1, 2013 with the aim of bringing together the domestic and overseas wisdom and experience through the enhancement of the current integrated management function of the research and development project and the international and mutual collaboration and cooperative platforms. Regarding the innovative approach for fuel debris retrieval, the “Request for Information (RFI) of innovative approach for fuel debris retrieval” was conducted until this January as one of the projects of IRID. The RFI was a request to provide information in order to gather domestic and overseas wisdom for understanding what technologies, ideas, etc. are available, and the gathered information was used for planning this new project.

The aim of this project is to study the concept of the innovative approach for the fuel debris retrieval and the feasibility of the essential technologies to support such methods without submerging based on the result of the RFI.

## 2. RFP Topics

This project consists of three topics, (1) - (3), and is aimed at conceptual study for the Innovative Approach to retrieve the fuel debris in the air without submerging PCV with water, and feasibility study of essential technologies to support the Innovative Approach .

The concept of Innovative Approach is illustrated in Fig.1 in comparison to the submersion method. The definitions of those methods are as follows:

Submersion method: Method in which the fuel debris is cut and stored under water

Innovative Approach\*: Method in which the fuel debris is cut and stored in the air, or cut under water but stored in the air.

Table 1 and Table 2 list the meanings of abbreviations and definitions of the words used in this Request for Proposal.

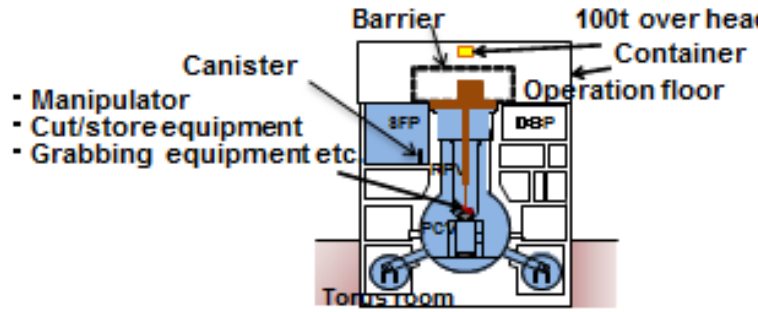
\* Innovative Approach: An alternative method to be able to substitute for the Submersion Method for fuel debris retrieval.

**Submersion method:** Method in which fuel debris is cut and stored under water

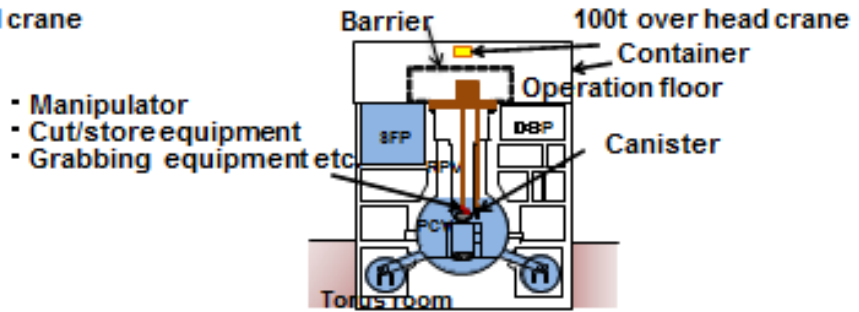
**Innovative Approach:** Method in which fuel debris is cut and stored in air, or cut underwater but stored in air.

### Examples

#### Submersion method

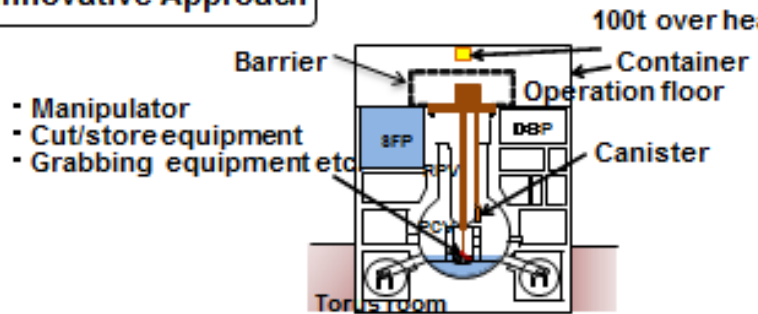


Fuel debris cut and stored underwater

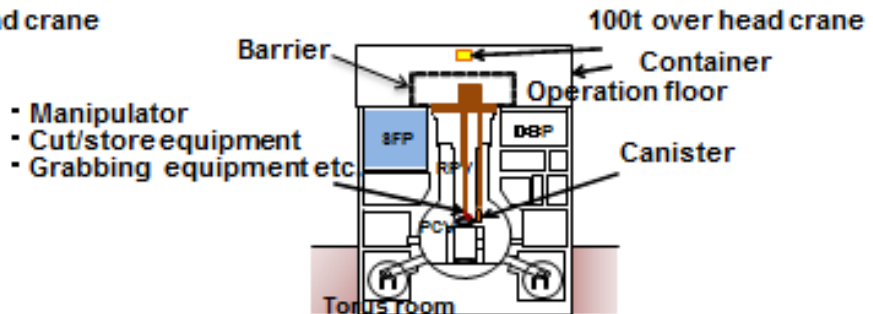


Fuel debris cut and stored underwater (PCV partial submersion)

#### Innovative Approach



Fuel debris stored in air



Fuel debris cut and stored in air

Fig.1 Concept of Submerging Method and Innovative Approach (Dry Method)

Table 1 Abbreviations used in this Request for Proposal

Abbreviations	Meaning
RFI	Request For Information
RFP	Request For Proposal
C/S	Conceptual Study
F/S	Feasibility Study
R&D	Research and Development
PCV	Primary Containment Vessel
RPV	Reactor Pressure Vessel
SFP	Spent Fuel Pool
DSP	Dryer Separator Pool

Table 2 Special Terms used in this Request for Proposal

Term	Meaning
operation floor	The operation floor is the top floor of the reactor building. Here, works such as fuel exchange are executed during the planned outage of the nuclear reactor. If fuel debris retrieval from the top of the PCV is envisaged, the works will be done using this floor.
boundary	Same as PCV boundary. PCV boundary is a concept to express a barrier to prevent radioactive material from being released to outside during LOCA, and comprises PCV, isolation valve, and so on.
barrier	Physical area maintained in negative pressure to the outside. Designed to prevent the radioactive material from being released from inside PCV when opening the boundary. If the boundary of interest has a radiation shielding function, the barrier needs a similar capability.
container	A walled structure with a ceiling to cover the operation floor, capable of supporting a 100-ton class overhead crane.
dedicated plug	Equipment which has a dimension and radiation block capability equivalent to an existing shield plug. For example, the dedicated plug will be equipped with fuel debris retrieval machine, and a through hole to remove the fuel debris to the outside.
transport equipment	Equipment which transports visual and measurement devices and cutting devices to the prescribed position in the PCV.
telescopic mechanism	Transports equipment to the prescribed position by expanding and contracting the length of its arm.
canister	A container to accommodate retrieved fuel debris. The loaded canister will be stored in temporary storage (e.g. SFP), and moved to the outside of the nuclear power station in a larger container. The design of the canister will be decided based on the handling readiness and the consideration of criticality prevention.
internal structures	Located inside the PCV and the RPV, namely, steam dryer, steam separator, control rod drives, biological shield wall, pedestal, and piping.
cut	Divide the objects into small pieces by severing, fusing, grinding, and crushing.
dust collector	A piece of equipment to collect the chips or crumbs difficult to grab by the machine, or fume, or dust generated during the cutting of the fuel debris.

(1) Conceptual Study of Innovative Approach for Fuel Debris Retrieval

The fuel debris inside the RPV is considered to be not covered with water judging from the water level which is currently measured or estimated in Unit 1 to Unit 3 of the Fukushima Daiichi NPS. If the submersion method cannot be achieved, the fuel debris retrieval will necessarily be executed in the air.

Although retrieval work without covering fuel debris with water is advantageous in terms of criticality prevention, there are problems that the radiation shielding by the water is not added, and the fuel debris will not be cooled down adequately during the operation. Also there is a possibility of dispersion of radioactive material when retrieving fuel debris. Therefore, fuel retrieval work in the air will be carried out under severe conditions.

In addition, there also is the problem in that the internal structures in the PCV and the RPV could be an obstacle to access from outside to the fuel debris. The configuration of these components within the reactor vessel may be damaged and dispersed as well.

The objective of this project is to conduct a conceptual study for the method to retrieve the fuel debris in the air in a safe and stable condition.

(The details of the project are described in Exhibit 1.)

(2) Feasibility Study of Visual and Measurement Technology for Innovative Approach

The conditions and location of the objects (the fuel debris and internal structures) need to be identified in advance of the fuel debris retrieval in order to execute fuel debris retrieval in a safe and stable condition. The effective means of seeing inside are using visual device, such as cameras. Also, characterizing the properties of the objects (the fuel debris and internal structures) is an important factor in selecting cutting equipment to be used and identifying the cut objects to be stored. The characterization equipment exploiting features specific to nuclear fuels, such as radiation monitoring from neutrons, and decay heat measurement could be an option. In addition to the characterization of the objects (the fuel debris and internal structures), cutting operation shall be conducted in a safe and stable condition by measuring the radiation field around the objects, and monitoring for a possible hydrogen accumulation.

The dose rate inside the PCV and the RPV, however, is expected to be very high, and the inside is dark with no lighting, and is a high humidity environment with dripping water due to the continuous water injection. Also, visual and measurement equipment need to be inserted while avoiding obstacles in the narrow space inside the PCV and the RPV. Thus, internal observation and characterization of fuel debris required for fuel debris retrieval in the air will be carried out under severe conditions.

The objective of this project is to conduct a feasibility study of technology to realize practical application of compact and light-weight visual equipment with lighting function, and measurement equipment to characterize the properties of the objects (the fuel debris and internal structures) both of which can be used under the very high radiation environment.

(The details of the project are described in Exhibit 2.)

### (3) Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach

The fuel debris needs to be cut into a certain size in terms of the storage container capacity and criticality control.

The problem here is that the characteristics of the fuel debris are unknown. The fuel debris seems to exist as oxides of uranium and zirconium for the most part, but could be a mixed ceramics phase of control rod material (boron carbide) and stainless steel or highly porous substance such as a lava bed, or fused masses of heterogeneous mixture of fuel assembly and reactor internal structures. The fuel debris located in the bottom part of the PCV may have reacted with concrete. As a result, the level of hardness and brittleness of the fuel debris will vary widely.

Consequently, cutting of fuel debris will be carried out by using equipment with multiple functions or exchanging different devices corresponding to the situation. In the latter case, a system that enables the easy exchange of individual devices will need to be studied.

Collection of fume and dust when cutting the fuel debris in the air will be very difficult and must be addressed in the study to prevent dispersion of radioactive material and spread of contamination.

The objective of this project is to conduct a feasibility study of technology to realize practical application of the equipment capable of cutting the fuel debris (with dust collection function).

(The details of the project are described in Exhibit 3.)

### 3. Duration of this Project

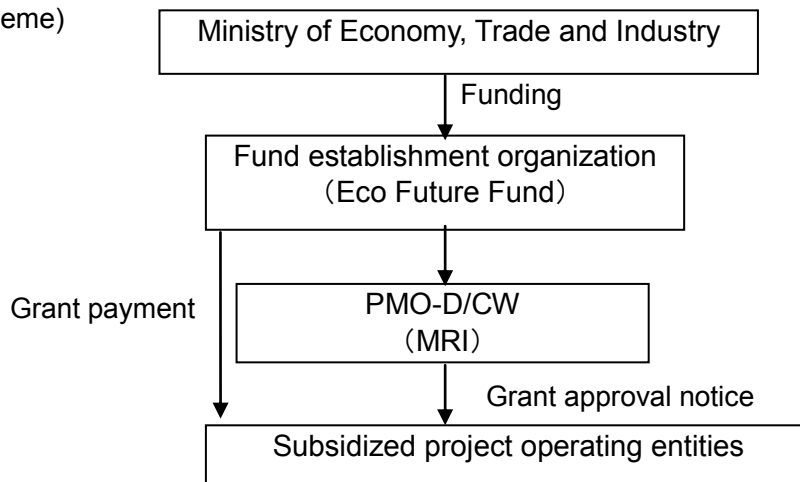
From the date of the grant decision to March 31, 2015

### 4. Project Scheme

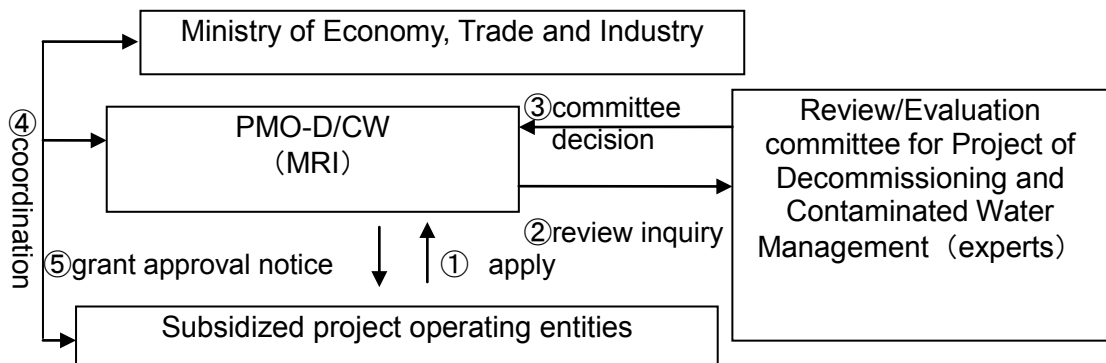
With the support of gathering domestic and overseas wisdom on contaminated water issues, METI will strongly support the feasibility studies and technology development for decommissioning and contaminated water management, in order to respond quickly and appropriately to technical challenges which could not be foreseen at the outset.

Utilizing the FY2013 Supplementary budget, METI has created the “Fund for the project on Decommissioning and Contaminated Water Management” and has selected the Mitsubishi Research Institute, Inc. (MRI) as Management Office for the Project of Decommissioning and Contaminated Water Management (abbreviated as “PMO-D/CW”). In this project, MRI is now executing the tasks related to confirming and validating technologies that will be useful for decommissioning and contaminated water management. Regarding the Fund scheme and the evaluation process, please see the diagrams and charts below.

(Fund Scheme)



(Applicants review process)



\*The decisions on granting a subsidy, the content of the work to be carried out, and the amount of the subsidy shall be made after consultations between the subsidized project operating entity and the PMO-D/CW and/or METI.

### 5. Application Requirements

The private companies, etc. satisfying all of requirements (1) to (8) shown below are qualified to apply for the subsidies. Applications from consortia are also acceptable. In that case, a managing legal entity must be appointed out of each consortium and submit the project proposal. (Please note that no managing legal entity may recommission the entire work to other legal entity.)

- (1) Possessing the organization for properly conducting the relevant subsidized project.
- (2) Having the capacity, knowledge and experience required for conducting the relevant subsidized project.

- (3) Having the management foundation required for smoothly conducting the relevant subsidized project and sufficient ability to control the funds and other resources.
- (4) Being able to implement the project in accordance with all the applicable laws and regulations enacted in Japan, and to follow the appropriate accounting procedures in accordance with the “Procedural Manual for conducting the projects subsidized by the Ministry of Economy, Trade and Industry<sup>(\*)</sup>”.
- (\*) [http://www.meti.go.jp/information\\_2/downloadfiles/jimusyori\\_manual.pdf](http://www.meti.go.jp/information_2/downloadfiles/jimusyori_manual.pdf)
- (5) Not foreseen to be subject to Articles 70 and 71 of the Cabinet Order concerning the Budget, Auditing and Accounting.
- (6) Not fulfilling any of the conditions stipulated in the “Guidelines for the suspension of subsidies controlled by the Ministry of Economy, Trade and Industry and the suspension of designation relating to the contracts”. (January 29, 2003, No 1) First column, the second items in Attachment
- (7) Being able to prepare the evidenced documents in Japanese or English, and present them in Japan as requested by the government, the funds establishment organization or PMO-D/CW.
- (8) All Intellectual Property (IP) generated during the course of this subsidized research project belongs to the subsidized project operating entity. However, the subsidized project operating entity is requested not to restrict the utilization of the IP without objectively reasonable justification, and to allow METI utilization of the IP for decommissioning and contaminated water management activities in the Fukushima Daiichi NPS. With regard to the conditions of using the IP, subsidized project operating entities are requested to discuss with METI.

## 6. Requirement Conditions for Grant Decision

### (1) Number of proposals to be adopted

For each project, one or more proposals will be adopted (See “2. RFP Topics”).

### (2) Subsidy rate and amount

The subsidy is a fixed amount and the upper limit for each project is 50,000,000 yen. Details of the project, subsidy amount, etc. will be decided after coordination between the PMO and METI.

### (3) Time of Payment

In principle, the subsidies are paid after the project is completed.

\*Please note that cases where the payment (i.e. the payment by estimate) before the completion of the project is permitted are limited. But there are exemptions, for example, it can be acceptable to divide the project period into some steps and to pay at times when each step is completed and the completion is confirmed. In any case, details of the project, subsidy amount etc. will be decided only after the grant decision and coordination with the PMO and with METI. Therefore, in the application, please clearly describe the specific request regarding the payment method, etc.

### (4) Confirmation of the amount of payment

The amount to be paid is decided based on the result report which is submitted by the operating entities after the project is complete as well as the results of the survey at the verification site and/or the office.

The amount to be paid will be the total of the expenses to be covered by the subsidies, which do not exceed the granted subsidy amount. For this reason, the account ledgers, receipts and other documents are necessary for supporting all the expenses. All the expenses will be strictly inspected and the expenses are strictly evaluated. Thus, the expenses not meeting the conditions mentioned above may be rejected even if in the range of the grant allowance.

## 7. Application Procedure

### (1) Application Period

Commencement: Friday, June 27, 2014

Deadline: Wednesday, August 27, 2014 (by noon, in Japan time). No application will be accepted after the deadline.

### (2) Information Session

Date: The information session for domestic companies is planned to be held on Friday, July 4<sup>th</sup> and for overseas companies in the middle of July. The session for domestic companies will also be made available via Internet.



Those wishing to attend the information session in Tokyo are advised to send an e-mail to the contact person shown in “12. Contact information.” The deadline for applying to attend the information session will be announced separately on the website. The instructions for viewing the information session online will be posted on the website separately. If you have any questions, please send them to: [retrieval@mri.co.jp](mailto:retrieval@mri.co.jp) . In a short time, the PMO-D/CW will answer the questions by mail, and publish their contents on the website.

When making contact, please title your e-mail “Register for attendance to the information session for ‘Project of Decommissioning and Contaminated Water Management (concept study of innovative approach for fuel debris retrieval and feasibility study of essential technology)’” and include the “corporate or organization name,” “name of the attendee,” “department,” “phone number,” “fax number,” and “e-mail address” in the main text.

(3) Application form and other documents to be submitted

[1] Please submit the following documents as one file. Please title your file “Application for the subsidy program ‘Project of Decommissioning and Contaminated Water Management (concept study of Innovative Approach for fuel debris retrieval and feasibility study of essential technology)’ (XX project: please specify the project name you apply for)”.

- Application form (Form 1)
- Plan proposal (Form 2)
  - Details of the work, its method and the plan for this subsidized project
  - Description of the achievements attained in subsidized projects similar to the relevant project, or the technical capabilities (i.e. availability of knowledge and capacity) necessary for implementing this subsidized project
  - Description of the financial basis which is necessary for implementing this subsidized project (i.e. The financial basis, the system for organizing and storing the evidential documents and other documents relating to the expenses, the financial conditions, etc.)
  - Estimated amount of the subsidies applied for (including the basis for expense unit prices) and financial plan, if necessary.
- Proposal Form (Form 3 (1)-(3))
  - Please use the form for the project for which you are applying.
- Certificate of Conformance (Form 4)
- Other documents
  - Corporate and organization data (i.e. name, address, foundation date, major business areas, organization chart and number of employees)
  - The financial results, and statement of revenues and expenses (for the past one year)
  - The articles of association or the act of endowment
  - Other supporting documents

\* The application documents ((Form 1 to 4 and other documents) shall be written in in Japanese or English.

\* For the application (Form 1 to 4 and other documents) , please use the Web Application System (see Attachment 3) on the web page of the Management Office for the Project of Decommissioning and Contaminated Water Management (<http://dccc-program.jp/>)

[2] All the application documents submitted will not be used for any purpose other than the evaluation in the course of selection process. Only committee members involved in the selection, as well as members of the government and the project management office involved in this project, are allowed to read these documents.

Please note that the application documents submitted will not be returned. We take the utmost care to preserve confidentiality. However, if your proposal is adopted, the information except the non-disclosure information (i.e. the personal information, the information detrimental to the legitimate interests of legal entities) may be disclosed under the “Act on Access to Information held by Administrative Organs” (Act No. 42 enacted on May 14, 1999).

If your proposal contains confidential information which should not be publicly shared, please clearly indicate such information in your proposal. If there are no relevant descriptions, you will be deemed to have agreed to disclose the entire text of the proposal.

[3] The costs spent for issuing the application documents and other documents will not be included in the expenses. Also, the costs spent for issuing those documents will not be compensated for regardless of whether the proposal is adopted or not.

[4] The matters described in your proposal are considered to be the fundamental policies which should be observed during the project. Consequently, please be sure to describe only the

matters which are feasible within the budget. Also, please note that even when your proposal is adopted, it may be rejected later on if you make a significant change in it at your discretion, or in case you cannot satisfy the conditions to be qualified for applying for the subsidies.

#### (4) Place of submission

For the application (Form 1 to 4 and other documents), please use the Web Application System (see the attachment 3) on the web page of the Management Office for the Project of Decommissioning and Contaminated Water Management. Although the applications via e-mail, post and such are not allowed, hand-carrying may be permitted at the management office's discretion when necessary. If you need to submit the application by hand, please contact us in advance.

\* Incomplete documents will be rejected and not subject to evaluation. Therefore, please carefully read and follow the procedures for application to correctly fill out the documents.

\* Any application documents submitted after the closing date won't be accepted.

### 8. Evaluation and Adoption

#### (1) Method of Evaluation

The applicants shall be evaluated based on the application documents by the Management Office of the Project. The applicants may be requested to make a presentation at "the Review/Evaluation Committee for Project of Decommissioning and Contaminated Water Management" (The schedule shall be announced after the proposal deadline.) All the expenses incurred in connection with the presentation such as travel expense shall be borne by the applicants. Also, hearings and inspection shall be conducted as required, and submission of additional documents may be requested.

#### (2) Evaluation Criteria

Regarding the proposed operation, the evaluation of the applicant's contents of the proposal (the purpose of operation, contents and implementation methods, operation implementation plan, operation implementation structure, past performance of operations, financial basis and management structure) and technical contents shall be conducted in accordance with the evaluation method shown in Exhibit 1 to 3 and the adoption of applicant will be decided based on the evaluation results.

However, all the basic items written in Exhibit 1 to 3 need to be described and if not, the applicant won't be reviewed regardless of evaluation of other items.

Also, the additional point items in Exhibit 1 to 3 will be graded according to the proposed contents.

#### (3) Allocation of marks in each RFP Topics

Please make sure to check the details of reviewing point of basic items and additional point items and their allocation of marks shown in Exhibit 1 to 3.

#### (4) Decision and Announcement of Results

After the discussion by the committee, the management office will announce the result of adoption to the adopted applicants. Also, the name of the adopted applicants will be released on the web page of the Management Office for the Project of Decommissioning and Contaminated Water Management (<http://dccc-program.jp/>).

### 9. Granting of Subsidy

When adopted, the applicant shall submit a grant application for the subsidy to PMO-D/CW.

The management office will check the content of the submitted document and if there is any problem in the contents, the office decides to allow the grant.

The project shall be initiated on the day the grant is allowed. The office will send a notice of granting to adopted applicants.

It should be noted that the office may ask the applicant to prepare additional documents or adjust the details, composition and scale of the operation, and the budget. As the result of consultation with METI, there may be changes in the details, composition and scale of the project as well as its budget. Also, please be aware that the subsidy may not be granted if the granting requirements are not met.

Although METI or the management office may provide subsidized project operating entities with information required to implement the project after the determination of grant, the entities may be requested to observe the confidentiality depending on the nature of the information.

## 10. Allocation of Expense

### (1) Classification of Expenses Covered by Subsidy

The expenses covered by the subsidy shall be those directly required for the implementation of the project. The specific items are listed below. Note that the definitive expenses covered by the subsidy shall be determined after the coordination with METI.

Items of Expense	Description
Labor Costs	Expenses for personnel required to implement the subsidized project.
Operating Costs	Expenses for raw materials, consumables, design/fabrication/processing, facility/equipment, goods purchase, research, outsourcing, travel, reward, rent/depreciation and other necessities.

### (2) Expenses not to be Included in Expenses Covered by Subsidy

- Office supply equipment (furniture such as desks, chairs and bookshelves, office machinery and so forth) with which the applicants should already be provided when considering the nature of the project.
- Expenses for purchasing land and buildings
- Expenses for handling accidents and disasters that occurred during the project. (However, cancellation fees incurred by reasons not attributable to subsidized project operating entities may be directly included as an expense. Please consult the person in charge on this matter.)
- Expenses unrelated to the project

### (3) Exclusion of Consumption Tax from Expenses Covered by Subsidy

If general and local consumption taxes (hereafter referred to as "consumption tax") are included in the subsidy amount, the applicants shall be requested to submit a report after the settlement of tax amount, according to the granting guidelines.

This is so specified as to demand, at the time of filing an income tax return, that subsidized project operating entities should report and return the amount to which the subsidy has been applied, out of the amount of deduction for taxable purchase, so that the amount for which the subsidy has been allocated out of the amount of deduction for taxable purchase shall not be detained.

However, because the report mentioned above is based on an income tax return that will be filed after the settlement of the subsidy, occasional delinquency in reporting due to lapse of memory has been found. Also, in order to avoid the complicated office procedures that need to be followed by subsidized project operating entities, the consumption tax shall be handled as follows.

When determining the amount of subsidy applied for in the grant application, the consumption tax must be excluded from the expenses covered by the subsidy before calculating the subsidy amount and submitting the application.

However, to avoid hindrance to the implementation of the subsidized project, such subsidized project operating entities as those listed below shall be permitted to include the consumption tax in the expenses covered by the subsidy when calculating the amount of subsidy.

- [1] Subsidized project operating entities who are not classified as taxpayers under the Consumption Tax Act
- [2] Subsidized project operating entities who are tax-exempt business entities
- [3] Subsidized project operating entities who are business providers subject to simplified tax
- [4] National or local governments (limited to cases when project is conducted with a special account), or subsidized project operating entities who are corporations listed in the attached Table 3.
- [5] Subsidized project operating entities who are using the general account of a national or local government
- [6] Subsidized project operating entities who are taxable business providers that choose a refund of consumption tax, following confirmation of consumption tax and purchase tax deductions, for instance due to a low amount of taxable sales

## 11. Miscellaneous

- (1) Any expenses incurred before the date when the decision on grant of the subsidy is made

- (including expenses for order placement) shall not be covered by the subsidy program.
- (2) In the event that the subsidized project operating entity desires to make a purchase or other contract related to material procurement or involving an occurrence of cost, it shall invite open competitive bidding, as a general rule, from the viewpoint of cost effectiveness. If the subsidized project operating entity desires to outsource part of the subsidized project to a third party or conduct the project in partnership with a third party, it shall in advance make a contract on the implementation and report to PMO-D/CW.
  - (3) Once informed that the decision on grant of the subsidy is made, the subsidized project operating entity shall not change the subsidy budget distribution or the details of the subsidized project nor interrupt or terminate the project without prior approval from PMO-D/CW.
  - (4) The subsidized project operating entity shall promptly report the progress of the subsidized project, the status of the accounting and so on whenever required to do so by PMO-D/CW.
  - (5) After the subsidized project is completed (or the project termination is approved), the subsidized project operating entity shall submit a project result report to the management office for the Project of Decommissioning and Contaminated Water Management within 30 days from the date of completion or April 10<sup>th</sup> of the next fiscal year (FY 2015), whichever is earlier.
  - (6) The subsidized project operating entity shall keep accounts on any expenditures for the subsidized project with dedicated account books accompanied by all written evidences in a way that is clearly differentiated from the other accounting to ensure that all incomes and expenditures be meticulously accounted for. The entity shall maintain the account books at least five years after the fiscal year in which the dates during the subsidized project period and the date of completion (or the date of approval for termination) are included so that they can be accessible whenever requested by METI, fund establishment company and PMO-D/CW.
  - (7) With respect to the assets acquired or the utility of which has increased through the subsidized project (hereinafter referred to as "the Acquired Assets, etc."), the subsidized project operating entity shall manage them with due care of a prudent manager even after the completion of the subsidized project, and strive to effectively make use of them in accordance with the purpose of the grant of the subsidy. All applicable Acquired Assets, etc. shall be properly controlled using an Acquired Asset Ledger during the asset disposal restriction period, which will be separately set forth.
  - (8) The subsidized project operating entity cannot dispose of (i.e., use, transfer, loan or offer as collateral assets contrary to the purpose of the grant of the subsidy) any Acquired Asset having a unit price equal to or higher than 500 thousand yen (tax excluded) during the period separately set forth. However, the entity could dispose of an Acquired Asset only when it needs to do so and obtains prior approval. In this case, the entity shall pay part or the entire subsidy amount as a general rule. (The maximum payment does not exceed the subsidy amount for the appropriate asset to be disposed of).
  - (9) After the completion of the subsidized project, the Board of Audit may visit the premises of the subsidized project operating entity for inspection.
  - (10) The subsidized project operating entity shall carry out the project by consulting with METI and PMO-D/CW thoroughly.

## 12. Contact Information

Shimbashi JB Building 5th Floor, 9-5, Shimbashi 6-chome Minato-ku, Tokyo 105-0004, Japan  
Responsible personnel: Dr. Takizawa, Mr. Nakajima, Mr. Ashida,  
Management Office for the Project of Decommissioning and Contaminated Water Management  
Mitsubishi Research Institute, Inc.  
Phone: 03-5425-2871  
E-mail: [retrieval@mri.co.jp](mailto:retrieval@mri.co.jp)

Please contact us via e-mail. We regret that no inquiries will be accepted by phone.

Thank you

(Form 1)

To: Management Office for the Project of Decommissioning and Contaminated Water Management

Project of Decommissioning and Contaminated Water Management (Conceptual Study of Innovative Approach for fuel debris retrieval and feasibility study of essential technologies)” in the FY2013 Supplementary Budget

Please circle one which you apply for.

- Conceptual study project of Innovative Approach for fuel debris retrieval
- Feasibility study project of visual and measurement technologies for Innovative Approach
- Feasibility study project of cutting fuel debris and dust collection technologies for Innovative Approach

### Application Form

Applicant	Company/ Organization Name		
	Representative (Full Name and Title)		Seal or Signature
	Address		

## Proposal Format for Conceptual Study of Innovative Approach for Fuel Debris Retrieval and Feasibility Study of Essential Technologies

<b>(1) Project purpose, details and implementation method</b>	
*Describe the purpose of this proposal in detail based on the background of decommissioning and contaminated water management so far.	
<b>CHECK ITEM</b>	
*Check if the following items are written in detail and check the box if applicable. *Please fill out all the basic points and the additional points are non-mandatory.	<b>CHECK BOX</b>
<b>【Basic Point】</b> <ul style="list-style-type: none"><li>The purpose and contents of the operation are inconsistent with those of this Request for proposal and described in detail.</li></ul>	<input type="checkbox"/>
<b>【Additional Point】</b> —	
<b>(2) Project Implementation Plan</b>	
* Describe the implementation schedule for the operations you apply for (on a monthly basis). * Describe the implementation procedure in detail. * Establish and state milestones, that is, the concrete goals for fulfilling the implementation purposes. * Write down the reporting items at the committee's quarterly progress report meeting (interim and final reports) you will attend in the schedule.	
<b>CHECK ITEM</b>	
*Check if the following items are written in detail and check the box if applicable. *Please fill out all the basic points and the additional points are non-mandatory.	<b>CHECK BOX</b>
<b>【Basic Point】</b> <ul style="list-style-type: none"><li>The project implementation plan (schedule) is appropriate for the project purposes and contents.</li></ul>	<input type="checkbox"/>
<b>【Additional Point】</b> <ul style="list-style-type: none"><li>The substantial evidence for implementing the project appropriately (staff, procedures, etc.) are written in the project implementation plan (schedule).</li><li>The project implementing procedures are created so that they will be conducted effectively.</li></ul>	<input type="checkbox"/> <input type="checkbox"/>

**(3) Project Implementation Scheme**

- \* Provide a diagram of your project implementation scheme and state the number of persons engaged in the scheme and their roles.
- \* List the top project manager and those involved in the leadership of the project including their brief personal history, specialized field and track record of similar projects.
- \* Description of outsourcing, if scheduled.
- \* In case of working with other companies as a consortium, state clearly which one is the representative company and which one is other company/organization which comprise the consortium.

<b>CHECK ITEM</b>	<b>CHECK BOX</b>
*Check if the following items are written in detail and check the box if applicable. *Please fill out all the <u>basic points</u> and the additional points are non-mandatory.	
<b>【Basic Point】</b> <ul style="list-style-type: none"> <li>• The structure diagram and roles of the operation are consistent with the contents of the project.</li> <li>• The number of personnel needed for executing the project is ensured.</li> <li>• The number of needed personnel, the structure, and the sharing roles are written clearly.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>【Additional Point】</b> <ul style="list-style-type: none"> <li>• The company has a structure to respond with requests from the management office of this project promptly and flexibly.</li> <li>• The company has a structure to proceed with the project immediately after conclusion of the contract.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/>

**(4) Track Record of Other Projects**

- \* Describe your organization's track record of similar projects. Include the following items:
  - Project name, project overview, fiscal year(s) of the project, project owner (if it is your own project, state so); and
  - The concrete evidence that the above records are usable for this proposal.
- \* List major full-time personnel solely committed to this project including their specialized field and track record of similar projects (excluding those personnel listed in the above item (3)).
- \*In case of working with other companies as a consortium, state clearly which company/organization implemented each similar project.

<b>CHECK ITEM</b>	<b>CHECK BOX</b>
*Check if the following items are written in detail and check the box if applicable. *Please fill out all the <u>basic points</u> and the additional points are non-mandatory.	
<b>【Basic Point】</b> <ul style="list-style-type: none"> <li>• The company's expert knowledge and accumulated know-how is enough to implement the project.</li> </ul>	<input type="checkbox"/>
<b>【Additional Point】</b> <ul style="list-style-type: none"> <li>• The company has technical findings and expert knowledge related to the project as well as accumulated know-how and such.</li> <li>• The company has experience in other projects and the network of specialized institutions which are usable for implementing this project.</li> <li>• (In case of C/S for Innovative Approach) Proposer has experience in implementing similar method, and project related to decommissioning by managing through the entire project and process as an organization.</li> <li>• (In case of F/S for Innovative Approach) Proposer has experience in the proposed technology and/or the existing technology as a basis for the proposed technology (including feasible idea) as an organization.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

**(5) Financial Basis and Management System**

\*Explain and show the evidence that your fiscal condition is good enough to implement this project smoothly.

\*State your adequate system (persons in charge and their role) for financial management (filing and storing of written evidences for expenditures).

\*In case of working with other companies as a consortium, state the above items for every company/organization.

<b>CHECK ITEM</b>	<b>CHECK BOX</b>
<p>*Check if the following items are written in detail and check the box if applicable. *Please fill out all the basic points and the additional points are non-mandatory.</p>	
<p><b>【Basic Point】</b></p> <ul style="list-style-type: none"> <li>• The company has the financial basis for implementing this project (and has a system of organizing and storing evidential documents of expenditure, etc.)</li> <li>• It is confirmed that the company can do accounting work without fault for this project as a contractor.</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>
<p><b>【Additional Point】</b></p> <p style="text-align: center;">—</p>	

**(6) Total Project Cost**

\*Describe necessary expenses according to 10. (1) "Expenditure Classification" of the subsidy application procedure. Note that the expense items listed below are only provided as examples.

\*In case of working with other companies as a consortium, state clearly the labor cost and the project cost of each company/organization.

\* Show the amounts in Japanese currency.

\*The amount of consumption tax and local consumption tax shall be excluded from each expense item.

I Labor cost

II Operating cost

[1] Expenses for raw materials

[2] Consumables

[3] Design, manufacturing and processing

[4] Facility and equipment,

[5] goods purchase

[6] Research

[7] Outsourcing

[8] Travel

[9] Reward

[10] Rent and depreciation

[11] Other necessities

Total amount thousand yen

(\*The total amount shall not exceed the upper limit of the subsidy. If exceeding, you will be not subject to the evaluation.)

<b>CHECK ITEM</b>	<b>CHECK BOX</b>
<p>*Check if the following items are written in detail and check the box if applicable.</p>	
<ul style="list-style-type: none"> <li>• The necessary expense is divided into the categories as shown in the "XX expense" of guideline of the applicants.</li> <li>• The total amount doesn't exceed the upper limit of the subsidy.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/>

You are required to write down all the items from (1) to (6) . If any of the items are omitted, you will be not subject to the evaluation.

\*Size of the column is allowed to be adjusted and figures and tables can be attached to this file.



## Proposal Form for Conceptual Study of Innovative Approach for Fuel Debris Retrieval

<b>(1) Feasibility of Innovative Approach</b>	
<ul style="list-style-type: none"> <li>• Detail of innovative approach is described.</li> </ul>	
<b>Contents to be checked.</b>	
<p>*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in &lt;Basic points&gt;, and items in &lt;Additional points&gt; if applicable.</p>	<b>Check box</b>
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>• Proposed method is based on the present knowledge of Fukushima Daiichi NPS.</li> <li>• Proposed method clearly specifies the location of the fuel debris (in PCV, in RPV or both) to study.</li> <li>• Proposed method clearly specifies a series of the operation methods and procedures from delivery, installation of equipment for the fuel debris retrieval, retrieval work, and removal of used equipment by using conceptual diagram and/or flow sheet etc.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p><b>&lt;Additional points&gt;</b></p> <ul style="list-style-type: none"> <li>• Method of accessing the fuel debris by passing through PCV, RPV, or removing internal structures to emplace the equipment close to the fuel debris.</li> <li>• Location of installing fuel debris canister, and transfer route and its method of the loaded canisters to the temporary storage area is appropriate.</li> <li>• Existing technologies required to establish the innovative approach, and essential technologies necessary to be developed</li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>(2) Considerations of Safety of the Method</b>	
<ul style="list-style-type: none"> <li>• Description of the safety of the method is described.</li> </ul>	
<b>Contents to be checked.</b>	
<p>*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in &lt;Basic points&gt;, and items in &lt;Additional points&gt; if applicable.</p>	<b>Check box</b>
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>• Dose reduction method is concrete and appropriate.</li> <li>• Method of maintaining boundary to prevent release of radioactive material caused by dispersion and backflow for each step during the operation period.</li> <li>• The issue that the construction method should not impose a serious impact on the reactor building or any other existing structures is recognized.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<p><b>&lt;Additional points&gt;</b></p> <ul style="list-style-type: none"> <li>• Ventilation and filtering within the barrier in consideration of dose reduction</li> <li>• Method of minimizing and mitigating the leakage of radioactive substances from PCV during the operation</li> <li>• Considerations of the seismic resistance</li> <li>• Maintenance method including equipment used for operation is appropriate.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

\*Size of the column is allowed to be adjusted and figures and tables can be attached to this file.

## Proposal Form for Feasibility Study of Visual and Measurement Technology for Innovative Approach

<b>(1) Basic Principle of Proposed Technology</b>	
<ul style="list-style-type: none"> <li>The basic principle of proposed technology is described.</li> </ul>	
<b>Contents to be checked.</b>	
*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in <Basic points>, and items in <Additional points> if applicable.	<b>Check box</b>
<b>&lt;Basic points&gt;</b> <ul style="list-style-type: none"> <li>The structure of the proposed technology and/or the basic principle of the system is specified.</li> </ul>	<input type="checkbox"/>
<b>&lt;Additional points&gt;</b> <ul style="list-style-type: none"> <li>Considerations to achieve the target specifications</li> </ul>	<input type="checkbox"/>
<b>(2) Specification of Proposed Technology</b>	
<ul style="list-style-type: none"> <li>Specifications of the proposed technology are described. If the proposed technology does not cover all of the items, list the missing item. If the proposed technology does not meet the target specification, explain the reason and describe the achievable specification.</li> </ul>	
<b>Contents to be checked.</b>	
*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in <Basic points>, and items in <Additional points> if applicable.	<b>Check box</b>
<b>&lt;Basic points&gt;</b> <ul style="list-style-type: none"> <li>Select the field of proposed technology. (visual or measurement technology)</li> <li>Select the applicable process and area in Table 2-1.</li> <li>Descriptions for following specifications are concrete and appropriate.               <ul style="list-style-type: none"> <li>*Shape and geometric envelope</li> <li>*Weight</li> <li>*Radiation resistance (dose rate and cumulative dose)</li> <li>*Operation temperature and humidity</li> </ul> </li> </ul>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>&lt;Additional points&gt;</b> <ul style="list-style-type: none"> <li>Descriptions for following specifications are concrete and appropriate.</li> </ul> <p>[Common specification for visual and measurement technology]</p> <ul style="list-style-type: none"> <li>*Maximum operation duration</li> <li>*Waterproof and dust-proof performance (if it is operable under water, so state.)</li> <li>*Operation procedures/equipment structure (wire/wireless, operating place, remote from or close to the equipment, and system structure.)</li> <li>*Availability of image processing function including noise treatment (if available, specify the content.)</li> </ul> <p>[Specification items only for visual technology]</p> <ul style="list-style-type: none"> <li>*Observation field</li> <li>*Monochrome/color</li> <li>*Resolution</li> <li>*Light-intensity (max and min)</li> <li>*Light-intensity controllability</li> <li>*Availability of pan tilt function</li> <li>*Pan tilt movable angle</li> <li>*Zoom function</li> <li>*Minimum curvature diameter (in the case of fiber scope, endoscope etc.)</li> </ul>	<input type="checkbox"/>

<p>[Specification items only for measurement technology]</p> <ul style="list-style-type: none"> <li>*Items to be measured (gamma ray, neutron, ultrasonic wave, laser, temperature, hydrogen etc.)</li> <li>*Measurement area (energy, effective dose or effective dose rate, flux, wavelength, angle and temperature)</li> <li>*Measurement distance</li> <li>*Measurement accuracy or resolution</li> <li>*Measurement time</li> <li>*Measurement view angle</li> <li>*Specify items required other than above.</li> </ul> <ul style="list-style-type: none"> <li>• Describe that the proposed technology is superior to the prescribed target specifications, the values are feasible and it has high radiation resistance.</li> <li>• Describe in detail the main issues in developing the proposed technology and its solutions, which are deemed feasible.</li> </ul>	<input type="checkbox"/>  <input type="checkbox"/>	
<b>(3) Existing Technology as a Basis of Proposed Technology</b>		
<ul style="list-style-type: none"> <li>• A currently existing technology as a basis of proposed technology is described.</li> </ul>		
<b>Contents to be checked.</b>		
<p>*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in &lt;Basic points&gt;, and items in &lt;Additional points&gt; if applicable.</p>		<b>Check box</b>
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>• Detail of the relations between existing technology as a basis of proposed technology and proposed technology.</li> </ul>	<input type="checkbox"/>	
<p><b>&lt;Additional points&gt;</b></p> <p style="text-align: center;">—</p>		

\*Size of the column is allowed to be adjusted and figures and tables can be attached to it.

## Proposal Form for Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach

<b>(1) Basic Principle of Proposed Technology</b>	
<ul style="list-style-type: none"> <li>The basic principle of proposed technology is described.</li> </ul>	
<b>Contents to be checked.</b>	<b>Check box</b>
<p>*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in &lt;Basic points&gt;, and items in &lt;Additional points&gt; if applicable.</p>	
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>Structure of proposed technology and/or basic principle of system structure are described in detail.</li> </ul>	<input type="checkbox"/>
<p><b>&lt;Additional points&gt;</b></p> <ul style="list-style-type: none"> <li>Considerations to achieve the target specifications.</li> </ul>	<input type="checkbox"/>
<b>(2) Specification of Proposed Technology</b>	
<ul style="list-style-type: none"> <li>Specifications of the proposed technology are described. If the proposed technology does not cover all of the items, list the missing item(s). If the proposed technology does not meet the target specification, explain the reason and describe the achievable specification.</li> </ul>	
<b>Contents to be checked.</b>	<b>Check box</b>
<p>*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in &lt;Basic points&gt;, and items in &lt;Additional points&gt; if applicable.</p>	
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>Applicable process and area selected from Table 3-1.</li> <li>Descriptions for following specifications are concrete and appropriate.               <ul style="list-style-type: none"> <li>*Shape and geometric envelope</li> <li>*Weight</li> <li>*Radiation resistance (dose rate and cumulative dose)</li> <li>*Operation temperature and humidity</li> </ul> </li> </ul>	<input type="checkbox"/> <input type="checkbox"/>
<p><b>&lt;Additional points&gt;</b></p> <ul style="list-style-type: none"> <li>Descriptions for following specifications are concrete and appropriate.               <ul style="list-style-type: none"> <li>*Maximum operation duration</li> <li>*Waterproof and dust-proof performance (if it is operable under water, so state.)</li> <li>*Method of supply power (electric or hydraulic)</li> <li>*Max cutting depth (thickness)</li> <li>*Cutting speed (efficiency)</li> <li>*Availability of fume and dust collection/capturing function and its performance</li> <li>*Material of machinable object</li> <li>*Specification items required other than above</li> </ul> </li> <li>Describe that the proposed technology is superior to the prescribed target specifications, the values are feasible and the proposed technology has high cutting capability.</li> <li>Describe in detail the main issues in developing the proposed technology and its solutions, which are deemed feasible.</li> </ul>	<input type="checkbox"/> <input type="checkbox"/>
<b>(3) Existing Technology as a Basis of Proposed Technology</b>	
<ul style="list-style-type: none"> <li>A currently existing technology as a basis of proposed technology and details of the following contents are described.</li> </ul>	
<b>Contents to be checked.</b>	<b>Check box</b>
<p>*Please check the box if the following items are described. *Please make sure that you fill in all the items listed in &lt;Basic points&gt;, and items in &lt;Additional points&gt; if applicable.</p>	
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>Detail of the relations between existing technology as a basis of proposed technology and proposed technology.</li> </ul>	<input type="checkbox"/>
<p><b>&lt;Additional points&gt;</b></p> <p style="text-align: center;">—</p>	

\*Size of the column is allowed to be adjusted and figures and tables can be attached to it.

(Form 4)

## Certificate of Conformance to Qualification Requirements for the Conceptual Study of Innovative Approach for Fuel Debris Retrieval and Feasibility Study of Essential Technologies

I confirm that the applicant satisfies the qualification requirements for this subsidized project.

No.	Requirements	Verification, etc.
(1)	Possessing the organization for properly conducting the relevant subsidized project.	<State that the applicant satisfies the requirements with reasons in detail ><See Form 2 “(3) Project Implementation Scheme” when necessary.>
(2)	Having the capacity, knowledge and experience required for conducting the relevant subsidized project.	<State that the applicant satisfies the requirements with reasons in detail><See Form 2 “(4) Track Record” when necessary.>
(3)	Having the management foundation required for smoothly conducting the relevant subsidized project and sufficient ability to control the funds and other resources.	<State that the applicant satisfies the requirements with reasons in detail ><See Form 2 “(5) Financial bases and Implementation Scheme when necessary.>
(4)	Being able to implement the project in accordance with all the applicable laws and regulations enacted in Japan, and to follow the appropriate accounting procedures in accordance with the “Procedural Manual for conducting the projects subsidized by the Ministry of Economy, Trade and Industry (*)”. (*) <a href="http://www.meti.go.jp/information_2/downloadfiles/jim_usyori_manual.pdf">http://www.meti.go.jp/information_2/downloadfiles/jim_usyori_manual.pdf</a>	<State that you understand the statement on the left>
(5)	Not foreseen to be subject to Articles 70 and 71 of the Cabinet Order concerning the Budget, Auditing and Accounting.	<State that it does not apply to the applicant>
(6)	Not fulfilling any of the conditions stipulated in the “Guidelines for the suspension of subsidies controlled by the Ministry of Economy, Trade and Industry and the suspension of designation relating to the contracts”. (January 29, 2003, No 1) First column, the second items in Attachment	<State that it does not apply to the applicant>
(7)	Being able to prepare the evidenced documents in Japanese or English, and present them in Japan as requested by the government, the funds establishment organization or PMO-D/CW.	<State that it is possible>
(8)	All Intellectual Property (IP) generated during the course of this subsidized research project belongs to the subsidized project operating entity. However, the subsidized project operating entity is requested not to restrict the utilization of the IP without objectively reasonable justification, and to allow METI utilization of the IP for decommissioning and contaminated water management activities in the Fukushima Daiichi NPS. With regard to the conditions of using the IP, subsidized project operating entities are requested to discuss with METI.	<State that you understand the statement on the left>

<Precaution for Filling out this Form>

In the verification columns, please write the reasons why you verified that the applicant meets the requirements. When filling it out, write “Attachment” if there are any verification documents attached to this form and if not, write “No attachment.”

## Exhibit 1 Conceptual Study of Innovative Approach for Fuel Debris Retrieval

### 1. Requirements for Project Implementation

This project is to conduct C/S for the fuel debris retrieval described in “2.1 Explanation of the Innovative Approach for Fuel Debris Retrieval.”

Proposer for the C/S will be selected by scoring the proposal submitted based on “3. Procedures for Proposal of RFP.”

The selected proposer will provide interim and final reports for “2.3 Goals and Objectives of C/S” in consideration of “2.2 Assumptions and Prerequisites.”

Interim and final reports should be written in Japanese or English.

### 2. Details of Project Implementation

#### 2.1 Explanation of the Innovative Approach for Fuel Debris Retrieval

The Innovative Approach is a method in which the fuel debris is cut and stored in the air, or cut under water but stored in the air.

Examples include but are not limited to the following three methods for Innovative Approach of fuel debris retrieval, but any possible Innovative Approach can be proposed.

#### (1) Method of retrieving the fuel debris in the air from the top (fixed transport equipment) (refer to Fig.1-1)

This method accesses the fuel debris from the top by removing the shield plug, the PCV and RPV upper heads with the overhead crane, and then, dismantling the internal structures with the transport device (manipulator and telescope) and the cutting device equipped on the dedicated plug (including shielding function). The telescopic mechanism of the transport equipment allows the cutting device to access inside the PCV and the RPV for retrieving fuel debris.

In this example, it will be necessary to consider the scheme of installing the barrier and the new dedicated plug to prevent spread of contamination caused by dispersion of radioactive materials etc. upon the removal of the upper heads of the PCV and the RPV. Also the method to transfer the cut fuel debris stored in the canister to the SFP through the dedicated plug shall be considered.

#### (2) Method of retrieving the fuel debris in the air from the top (mobile platform) (refer to Fig.1-2)

This method accesses the fuel debris from the top by removing the shield plug, the PCV and RPV upper heads with the overhead crane, and then dismantling the internal structures with the cutting device equipped on the crane (e.g., gantry crane) installed on the operation floor. The mobile platform hung from the crane moves down into the PCV and the RPV and allows the cutting device to dismantle internal structures and retrieve fuel debris.

In this example, it will be necessary to consider the scheme of installation of the barrier with shielding function on the operation floor to prevent spread of contamination caused by dispersion of radioactive materials etc. upon the removal of the upper heads of the PCV and RPV. Also, the method to transfer the cut fuel debris stored in the container to the SFP shall be considered.

#### (3) Method of retrieving the fuel debris from the side (refer to Fig.1-3)

This method accesses the fuel debris from the side by creating a new opening on the first floor of reactor building.

The transport equipment allows the cutting device to access inside the PCV from the new opening, and to dismantle and remove the internal structures and retrieve the fuel debris.

In this example, it will be necessary to consider the scheme of creating large-size boreholes and the means of installing a barrier with shielding function to prevent spread of contamination caused by dispersion of radioactive material. Also the method to transfer the canister loaded with fuel debris to the temporary storage shall be considered.

#### 2.2 Assumptions and Prerequisites

The study shall be conducted in consideration of Table a-1 of Attachment 1.

### 2.3 Goals and Objectives of C/S

The scope of this C/S is a series of operations from delivery and installation of the equipment, fuel debris retrieval, and removal of used equipment.

Goals and Objectives of C/S are to conduct a study for Innovative Approach to retrieve the fuel debris inside the PCV and the RPV, and report the results of the study for the following items (1)-(4) within the contract period.

A more detailed study shall be required in C/S by reflecting the contents of the proposal submitted in RFP.

#### (1) Method of fuel debris retrieval

##### 1)Steps for fuel debris retrieval

- Detailed explanation of operational functions, steps and the detailed explanation for the proposed Innovative Approach.

##### 2)Layout of equipment for fuel debris retrieval

- Building interior and exterior layout for the equipment used for fuel debris retrieval.
- Approximate weight of the major large-size equipment used for fuel debris retrieval.

##### 3)Access location and method of fuel debris retrieval

- Preparation for fuel debris retrieval and pre-confirmation of the status of the site.
- Location and construction method of the opening to insert the equipment when using new opening.
- Method of accessing the fuel debris by passing through PCV, RPV, or removing internal structures to emplace the equipment close to the fuel debris.
- Requirements on the access route and end effectors under the spatial limitations (weight, shape etc.)

##### 4)Internal observation for fuel debris retrieval

- Method to observe the status of fuel debris retrieval work.
- Method to characterize the fuel debris during the fuel debris retrieval work.

##### 5)Fuel debris cooling method

- Alternative cooling method if the proposed retrieval method cannot maintain the current cooling scheme for fuel debris due to the dismantling of the internal structures.
- Method to cool the retrieved fuel debris during the storage in the air.

##### 6)Method of collecting the fuel debris

- Method of cutting, retrieving, and collecting the fuel debris.
- Method of minimizing and mitigating, and collecting the dust generated during cutting and retrieving fuel debris.
- Location and method of installing fuel debris storage canisters\*, and decontamination method of loaded canisters and transfer route and method of the loaded canisters to the temporary storage area (In principle, temporary storage area is SFP. However, if the SFP is not suitable for the retrieval method as in the case of retrieving the fuel debris from the side, an alternative storage area must be studied.)

\* For the specifications of fuel storage canisters, refer to P.25 of TMI-2, "TMI Fuel Characteristics for Disposal Criticality Analysis (DOE/SNF/REP-084)" An alternative temporary storage method can be proposed if its viability is proved by the comprehensive judgment based on the relevance to the proposed approach. (The design of storage container is under study in the separate subsidized project.)

##### 7)Technologies required for fuel debris retrieval

- Replacing technologies for the equipment used for fuel debris retrieval when the equipment is exposed to dose beyond its capacity.
- Sub-criticality monitoring method during fuel debris retrieval work
- Existing technologies and new technologies to be developed to realize the Innovative Approach.

##### 8)Removal of equipment

- Method of removing the equipment for repair and maintenance and for final removal after the completion of fuel debris retrieval.

##### 9)Waste disposal

- Type and amount of waste generated during fuel debris retrieval, its treatment after the operation, and disposal considerations
- (2) Items to be considered during the operation
- 1) Dose reduction
    - Method of minimizing exposure to workers as much as possible through the entire process from delivery and installation of equipment, fuel debris retrieval and removal of used equipment in consideration of the high-dose rate inside the building.  
(The location for the workers to operate the equipment needs to be considered for the above method.)
    - Method of shielding, and ventilation and filtering in the barrier in consideration of exposure to workers.
  - 2) Maintaining of boundaries
    - Method of maintaining boundary to prevent spread of contamination caused by dispersion and backflow of radioactive material.  
Examples:
      - Method of shielding to substitute for the shield plug on the upper section of PCV when removing it
      - Location and usage of the opening when accessing through an existing opening or penetration
      - Location and construction method when creating new openings in the PCV and/or RPV (including reinforcement of the constructed location)
    - Method of minimizing and mitigating leakage of radioactive substances from PCV during the operation
    - Assumed ambient atmosphere inside the PCV during fuel debris retrieval operation
  - 3) Seismic safety
    - Items and countermeasures to be considered to secure the seismic safety when installing new facilities (including boundary)
    - Items and countermeasures to be considered to prevent new facilities from making huge impact on the seismic safety of reactor building and existing facilities
  - 4) Maintenance
    - Method of maintaining equipment used for the operation including decontamination
    - Recovering function during the malfunction and run-down
    - Systematic backup measures to minimize and mitigate the impacts of the difficulties.
  - 5) Consideration of hydrogen accumulation
    - Consideration of the possibility of hydrogen accumulation inside the PCV and the RPV
- (3) Development plan to realize the proposed Innovative Approach
- Study of the issues, prospect of their solutions, and development period to realize Innovative Approach
  - Verification of development plan (details of development test including mockup test and solutions for the issues)
  - Approximate cost, schedule, and organization after the completion of C/S through the mockup test at proposer's facility in consideration of the studies above
- (4) Others
- Field visit and gathering the issues to be considered in the application of Innovative Approach to the site
  - Items required to be studied other than the contents in (1)-(3) above

### 3. Procedures for Proposal of RFP

#### 3.1 Contents to be described in RFP

The proposer shall understand well the contents of "2.2 Assumptions and Prerequisites" and "2.3 Goals and Objectives of C/S," and fill out the Forms 1, 2, 3(1) and 4. Note that the proposal shall be readable by using conceptual diagram and/or flow sheet etc.



#### 4. Evaluation Criteria for the Proposal and Applied points

##### 4.1 Evaluation Criteria

Evaluation items (Basic and Additional points) are shown in Tables 1-1 and 1-2. Each project is evaluated based on those tables.

Table 1-1 Evaluation Criteria of the Proposal for Conceptual Study of Innovative Approach for Fuel Debris Retrieval

Details of the proposal	Basic	Additional	Total
<b>Purpose, Contents, and Implementation Method of the project</b> (Technical evaluation for the details of the project and implementation method is performed based on Table 1-2.)	-	-	-
<b>&lt;Basic points&gt;</b> • The purpose and details of the project correspond with those described in this subsidy application procedure and its details are described.	5	-	5
<b>&lt;Additional points&gt;</b> (N/A)	-	-	
<b>Project Implementation Plan</b>	-	-	-
<b>&lt;Basic points&gt;</b> • Project implementation plan (schedule) is feasible for the purpose and detail of the project.	5	-	
<b>&lt;Additional points&gt;</b> • Project implementation plan (schedule) defines the basis for the applicability of project implementation (manpower, procedures etc.). • Project implementation procedure defines the know-how to implement the project efficiently.	-	5	10
<b>Project Implementation Scheme</b>	-	-	
<b>&lt;Basic points&gt;</b> • Diagram of implementation scheme and division of roles to implement project corresponds with project contents. • Sufficient human resources are secured for project execution. • The number of persons, scheme, and division of roles are defined.	5	-	10
<b>&lt;Additional points&gt;</b> • Scheme has been developed to respond quickly and flexibly to the requests from the management office of this project. • Scheme has been developed to start the project immediately after the conclusion of the contract.	-	5	
<b>Track Record of Other Projects</b>	-	-	
<b>&lt;Basic points&gt;</b> • Proposer has expertise and know-how etc. essential for execution as an organization.	5	-	
<b>&lt;Additional points&gt;</b> • Technical knowledge, expertise, know-how etc related to the contents of the project as an organization. • Proposer has experience in practical work and network practically useful for the project implementation and organization. • Proposer has experience in implementing similar method, and project related to decommissioning by managing through the entire project and process as an organization.	-	15	20
<b>Financial basis and Management System</b>	-	-	
<b>&lt;Basic points&gt;</b> • Financial basis for implementing this project (system for filing and storing of written evidences for expenditures). • Proposer is capable of stable account processing as a party implementing this project.	5	-	5
<b>&lt;Additional point&gt;</b> (N/A)	-	0	
<b>Total</b>	25	25	50

Table 1-2 Evaluation Criteria of the Proposal for Conceptual Study of Innovative Approach for Fuel Debris Retrieval (Technical)

Details of the proposal	Basic	Add	Total
<b>(1) Feasibility of Innovative Approach</b> Detail of Innovative Approach is described.	-	-	-
<b>&lt;Basic points&gt;</b> <ul style="list-style-type: none"> <li>Proposed method is based on the present knowledge of Fukushima Daiichi NPS.</li> <li>Proposed method clearly specifies the location of the fuel debris (in PCV, in RPV or both) to study.</li> <li>Proposed method clearly specifies a series of the operation methods and procedures from delivery, installation of equipment for the fuel debris retrieval, retrieval work, and removal of used equipment by using conceptual diagram and/or flow sheet etc.</li> </ul>	5	-	25
<b>&lt;Additional points&gt;</b> <ul style="list-style-type: none"> <li>Method of accessing the fuel debris by passing through PCV, RPV, or removing the internal structures to emplace the equipment close to the fuel debris.</li> <li>Location of installing fuel debris canister, and transfer route and its method of the loaded canisters to the temporary storage area is appropriate.</li> <li>Existing technologies required to establish the Innovative Approach, and essential technologies necessary to be developed</li> </ul>	-	20	
<b>(2) Considerations of Safety of the Method</b> Description of the safety of the method is described.	-	-	-
<b>&lt;Basic points&gt;</b> <ul style="list-style-type: none"> <li>Dose reduction method is concrete and appropriate.</li> <li>Method of maintaining boundary to prevent release of radioactive material caused by dispersion and backflow for each step during the operation period.</li> <li>The issue that the construction method should not impose a serious impact on the reactor building or any other existing structures is recognized.</li> </ul>	5	-	25
<b>&lt;Additional points&gt;</b> <ul style="list-style-type: none"> <li>Ventilation and filtering within the barrier in consideration of dose reduction</li> <li>Method of minimizing and mitigating the leakage of radioactive substances from PCV during the operation</li> <li>Considerations of the seismic resistance</li> <li>Maintenance method including equipment used for operation is appropriate.</li> </ul>	-	20	
<b>Total</b>	10	40	<b>50</b>

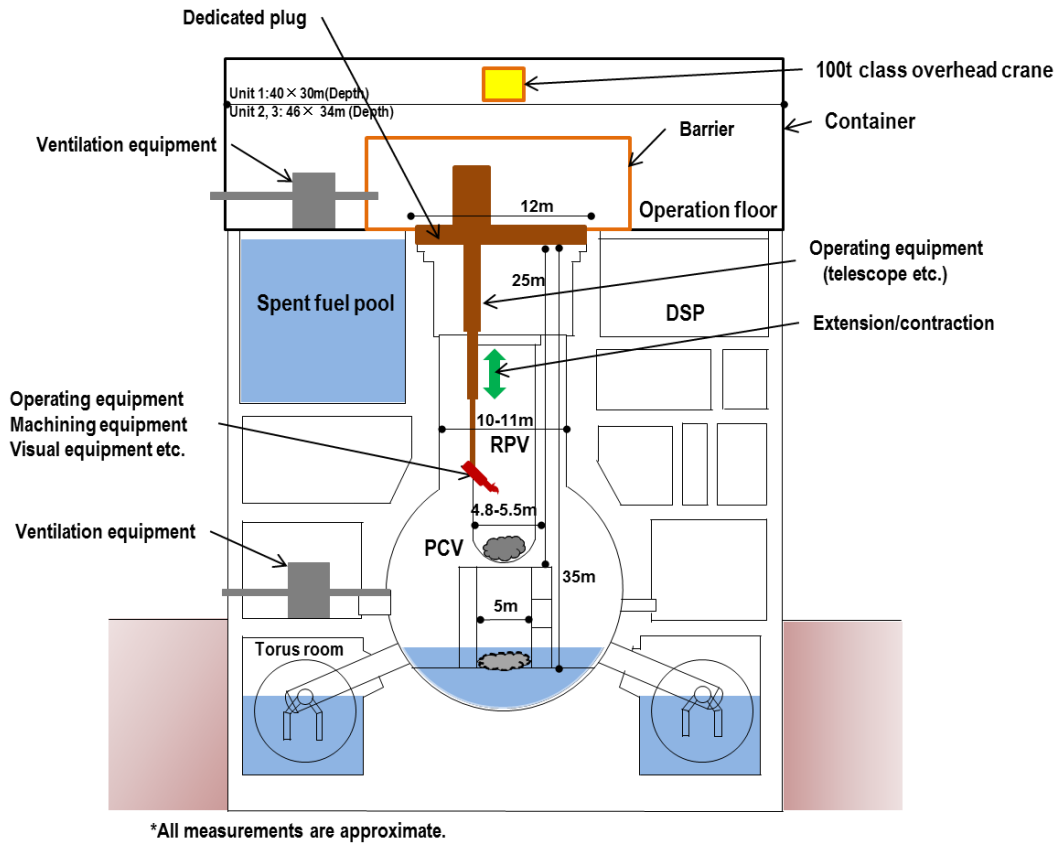


Fig.1-1 Method of retrieving the fuel debris in the air from the top (fixed transport equipment)

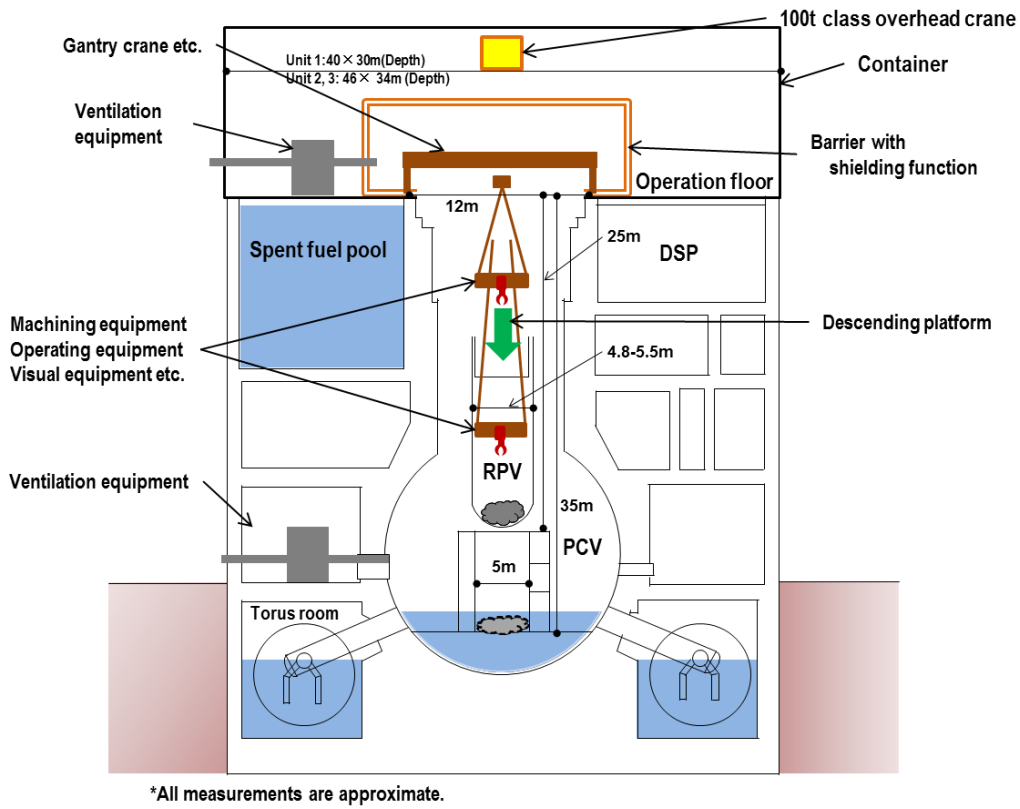


Fig. 1-2 Method of retrieving the fuel debris in the air from the top (mobile platform)

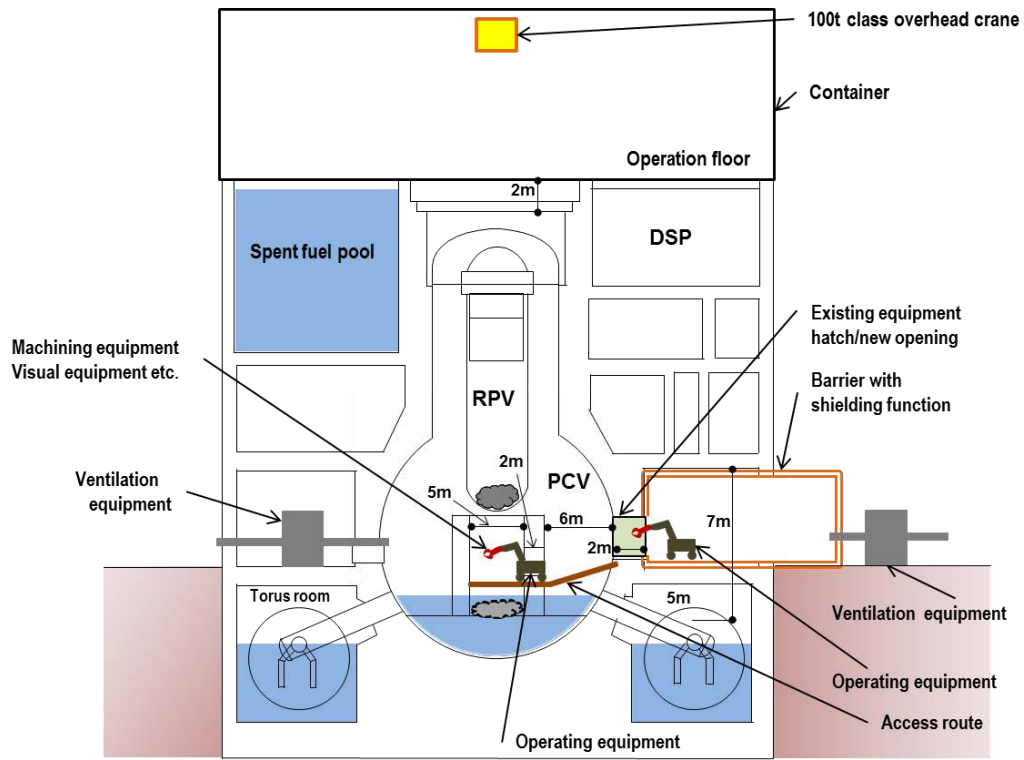


Fig. 1-3 Method of retrieving the fuel debris in the air from the side

## Exhibit 2 Feasibility Study of Visual and Measurement Technology for Innovative Approach

### 1. Requirements for Project Implementation

This project is to conduct F/S for the fuel debris retrieval described in “2.1 Explanation of the Feasibility Study of Visual and Measurement Technology for Innovative Approach.”

Proposer for the F/S will be selected by scoring the proposal submitted based on “3. Procedures for Proposal of RFP.”

The selected proposer will provide interim and final reports for “2.3 Goals and Objectives of F/S” in consideration of “2.2 Assumptions and Prerequisites” in the contract period.

Interim and final reports should be written in Japanese or English.

### 2. Details of Feasibility Study

#### 2.1. Explanation of the Feasibility Study of Visual and Measurement Technology for Innovative Approach

Compact and light-weight visual and measurement equipment usable under a high radiation environment and other severe conditions is required for the execution of the Innovative Approach.

In the project scope of the visual technology, the equipment (with lighting function) shall be developed to detect conditions and locations of internal structures and the fuel debris in the PCV and the RPV. Examples of visual technology include a camera, endoscope, and fiber scope etc. The lighting applied for this technology needs to be compact, high powered, and light-intensity controllable.

In the project scope of measurement technology, the equipment is required to be developed to distinguish fuel debris by its internal condition, external shape and properties. Also required is equipment to measure the radiation field around the objects to be cut, and to detect the hydrogen buildup. The measurements must be performed in situ without carrying out the fuel debris. Examples of measurement technology include radiation monitor, ultrasonic detector, laser scanner, radionuclide analyzer, thermography, and hydrogen detector.

The objective of this project is to conduct feasibility study of technology to realize practical application of measurement equipment satisfying these requirements. Please note that the proposal for RFP shall be made for either or both of the visual and measurement equipment.

The target specifications for the visual and measurement equipment are listed in Table 2-1. (Please refer to the “The explanatory details of target specification” in Attachment 2 for the basis of the set values.)

Table 2-1 Target Specifications Required for Visual and Measurement Equipment

Application process	Application area	Target specification		
		Radiation resistance	Basic shape	Target object
Status check of fuel debris etc.	PCV	Dose rate: 1kGy/h or more Cumulative dose: 30kGy or more	Dimension of X-6 opening (W550mm×H330mm) or less	Internal structures and fuel debris
	RPV	Dose rate: 10kGy/h or more Cumulative dose: 300kGy or more	φ100mm or less	Internal structures and fuel debris
Fuel debris retrieval	PCV/RPV	Dose rate: 10kGy/h or more Cumulative dose: 2MGy or more	φ100mm or less	Internal structures and fuel debris

2.2. Assumptions and Prerequisites

Study shall be conducted in consideration of Table a-1 of Attachment 1, and, if necessary, the examples of method (refer to Fig.1-1 to Fig.1-3 of Exhibit 1).

2.3. Goals and Objectives of F/S

Goals and Objectives of this F/S are to conduct study for visual and measurement technology, and report the feasibility for the following items (1)-(3), and report its feasibility within the contract period.

More detailed study shall be required in F/S based on the contents of a proposal submitted in RFP.

- (1) Basic plan for realization of the proposed technology
  - Specifications of visual and measurement equipment  
Study the feasibility for each specification item of proposed technology and report the results.
  - Structure and system of visual and measurement equipment  
Study the feasibility of structure and system of visual and measurement equipment, and report the results with its structure drawing and system diagram.
  - Method of remote attachment on and detachment from the transport equipment  
Study the remote attachment and detachment method with transport equipment (manipulator, remote operated vehicle, etc.) and report the results.
  - Method of remote control  
Study the method of remote controlling of visual and measurement equipment, and report the results
  - Method of results presentation  
Method to transmit observed information and measured results inside the PCV and RPV to the remote control room
  - Task solving  
Study solutions to the issues arising from the above studies, and report the results.  
If a test is required to solve the task, the testing plan shall also be provided.
- (2) Application to the site
  - Procedure for installation and assembly of visual and measurement device.
  - Wiring distance between visual and measurement equipment and operation point
  - Noise reduction method
  - Combination method for various kinds of visual and lighting equipment.
  - Field visit and identification of the issues to be considered.
- (3) Process, organizational structure and cost for realization of the proposed technology
  - Study for the issues, prospect of the solutions, and development period to realize proposed technology
  - Schedule and organizational structure

Report the schedule and organizational structure to apply proposed technology to the site.

- Cost evaluation

Report rough cost estimation for each step below.

- R&D

- Design

- Test manufacturing

- Test

- Manufacturing

### 3. Procedures for Proposal of RFP

#### 3.1 Contents to be described in RFP

The proposer shall understand well the contents of “2.2 Assumptions and prerequisites” and “2.3 Goals and Objectives of F/S” and fill out the Forms 1, 2, 3(2) and 4. Note that the proposal shall be readable by using conceptual diagram etc.

### 4. Evaluation Criteria for the Proposal and Applied points

#### 4.1 Evaluation Criteria

Evaluation items (Basic and Additional points) are shown in Tables 2-2 and 2-3. Each project is evaluated based on those tables.



Table 2-2 Evaluation Criteria of the Proposal for Feasibility Study of Visual and Measurement Technology for Innovative Approach

Details of the proposal	Basic	Additional	Total
<b>(1) Purpose, Contents, and Implementation Method of the project</b> (Technical evaluation for the details of the project and implementation method is performed based on Table 2-3.)	-	-	-
<b>&lt;Basic points&gt;</b> • The purpose and details of the project correspond with those described in this subsidy application procedure and its details are described.	5	-	5
<b>&lt;Additional points&gt;</b> (N/A)	-	-	
<b>(2) Project Implementation Plan</b>	-	-	-
<b>&lt;Basic points&gt;</b> • Project implementation plan (schedule) is feasible for the purpose and detail of the project.	5	-	
<b>&lt;Additional points&gt;</b> • Project implementation plan (schedule) defines the basis for the applicability of project implementation (manpower, procedures etc.). • Project implementation method defines the know-how to implement the project efficiently.	-	5	10
<b>(3) Project Implementation Scheme</b>	-	-	
<b>&lt;Basic points&gt;</b> • Diagram of implementation scheme and division of roles to implement project corresponds with project contents. • Sufficient human resources are secured for project execution. • The number of persons, scheme, and division of roles are defined.	5	-	10
<b>&lt;Additional points&gt;</b> • Scheme has been developed to respond quickly and flexibly to the requests from the management office of this project. • Scheme has been developed to start the project immediately after the conclusion of the contract.	-	5	
<b>(4) Track Record of Other Projects</b>	-	-	
<b>&lt;Basic points&gt;</b> • Proposer has expertise and know-how etc. essential for execution as an organization.	5	-	
<b>&lt;Additional points&gt;</b> • Technical knowledge, expertise, know-how etc related to the contents of the project as an organization. • Proposer has experience in practical work and network practically useful for the project implementation and organization. • Proposer has experience in the proposed technology and/or the existing technology as a basis for the proposed technology (including feasible idea) as an organization.	-	15	20
<b>(5) Financial basis and Management System</b>	-	-	
<b>&lt;Basic points&gt;</b> • Financial basis for implementing this project (system for filing and storing of written evidences for expenditures). • Proposer is capable of stable account processing as a party implementing this project.	5	-	5
<b>&lt;Additional point&gt;</b> (N/A)	-	0	
<b>Total</b>	<b>25</b>	<b>25</b>	<b>50</b>

Table 2-3 Evaluation Criteria of the Proposal for Feasibility Study of Visual and Measurement Technology for Innovative Approach (Technical)

Details of the proposal	Basic	Add	Total
<b>(1) Basic Principle of Proposed Technology</b> The basic principle of proposed technology is described.	-	-	-
<b>&lt;Basic points&gt;</b> • The structure of the proposed technology and/or the basic principle of the system is specified.	5	-	10
<b>&lt;Additional points&gt;</b> • Considerations to achieve the target specifications	-	5	
<b>(2) Specification of Proposed Technology</b> Specifications of the proposed technology are described. If the proposed technology does not cover all of the items, list the missing item(s). If the proposed technology does not meet the target specification, explain the reason and describe the achievable specification.	-	-	-
<b>&lt;Basic points&gt;</b> • Select the field of proposed technology. (visual or measurement technology) • Select the applicable process and area in Table 2-1. • Descriptions for following specifications are concrete and appropriate. *Shape and geometric envelope *Weight *Radiation resistance (dose rate and cumulative dose) *Operation temperature and humidity	5	-	35
<b>&lt;Additional points&gt;</b> • Descriptions for following specifications are concrete and appropriate. [Common specification for visual and measurement technology] *Maximum operation duration *Waterproof and dust-proof performance (if it is operable under water, so state.) *Operation procedures/equipment structure (wire/wireless, operating *place, remote from or close to the equipment, and system structure.) *Availability of image processing function including noise treatment (if available, specify the content.)  [Specification items only for visual technology] *Observation field *Monochrome/color *Resolution *Light-intensity (max and min) *Light-intensity controllability *Availability of pan tilt function *Pan tilt movable angle *Zoom function Minimum curvature diameter (in the case of fiber scope, endoscope etc.) [Specification items only for measurement technology] *Items to be measured (gamma ray, neutron, ultrasonic wave, laser, temperature, hydrogen etc.) *Measurement area (energy, effective dose or effective dose rate, flux, wavelength, angle and temperature) *Measurement distance *Measurement accuracy or resolution *Measurement time	-	30	

<p>*Measurement view angle</p> <p>*Specify items required other than above.</p> <ul style="list-style-type: none"> <li>• Describe that the proposed technology is superior to the prescribed target specification, and the values are feasible, and also it has high radiation resistance.</li> <li>• Describe in detail the main issues in developing the proposed technology and its solutions, which are deemed feasible.</li> </ul>			
<p><b>(3) Existing Technology as a Basis of Proposed Technology</b> A currently existing technology as a basis of proposed technology is described.</p>	-	-	-
<p><b>&lt;Basic points&gt;</b></p> <ul style="list-style-type: none"> <li>• Detail of the relations between existing technology as a basis of proposed technology and proposed technology</li> </ul>	5	-	5
<b>Total</b>	15	35	<b>50</b>

## Exhibit 3 Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach

### 1. Requirements for Project Implementation

This project is to conduct F/S for the fuel debris retrieval described in “2.1 Explanation of the Feasibility Study of Cutting and Dust Collection Technology for Innovative Approach.”

Proposer for the F/S will be selected by scoring the proposal submitted based on “3. Procedures for Proposal of RFP”.

The selected proposer will provide interim and final reports for “2.3 Goals and Objectives of F/S” in consideration of “2.2 Assumptions and Prerequisites” in the contract period.

Interim and final reports should be written in Japanese or English.

### 2. Details of Feasibility Study

#### 2.1 Explanation of Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach

Equipment usable under a high radiation environment and capable of cutting fuel debris with different levels of hardness is required to perform the fuel debris retrieval in the air in stable condition. The fuel debris retrieval in the Innovative Approach will be performed in either the in-air condition or the in-water-showering condition.

The fuel debris needs to be cut into a certain size in terms of the storage container size and criticality control. Examples of cutting technology include laser, plasma, ore boring, and rock drill etc. It is acceptable to use different cutting equipment specific to each condition as debris is not homogeneous.

When cutting the fuel debris, the function of collecting and capturing the resulted chips and crumbs, fumes, and dust, which are difficult to grab by tools, needs to be considered.

The objective of this project is to conduct feasibility study of technology to realize practical application of cutting equipment (including dust collection function) satisfying these requirements.

The target specifications for the cutting equipment are listed in Table 3-1. (Please refer to the “The explanatory details of Target Specification” in Attachment 2 for the basis of set values.)

Table 3-1 Target Specifications Required for Cutting Equipment for Fuel Debris

Application process	Application area	Target specification			
		Radiation resistance	Target object	Target object of Material	Cutting size
Fuel debris retrieval	PCV RPV	Dose rate: 10kGy/h or more Cumulative dose: 2MGy or more	Fuel debris	Compound with different levels of hardness and brittleness in which boride, oxidized material, metal etc. are distributed heterogeneously (Refer to Fig.3-1)	100×100×100 mm or less

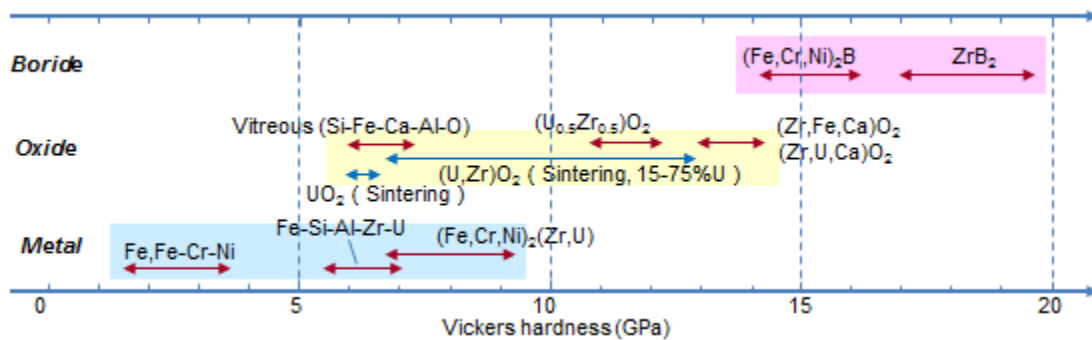


Fig.3-1 Vickers Hardness in each Phase of Simulated Debris

2.2 Assumptions and Prerequisites

The study shall be conducted in consideration of Table a-1 of Attachment 1, and, if necessary, the examples of method (refer to Fig.1-1 to Fig.1-3 of Exhibit 1).

2.3 Goals and Objectives of F/S

Goals and Objectives of this F/S are to conduct a study for cutting and dust collection technology, and report the feasibility of the study for the following items (1)-(3) within the contract period.

More detailed study shall be required in F/S based on the contents of a proposal submitted in RFP.

(1) Basic plan for realization of the proposed technology

- Specifications of cutting equipment  
Study the feasibility for each specification item of proposed technology and report the results.
- Structure and system of cutting equipment  
Study the feasibility of structure and system of cutting equipment (including dust collector), and report the results with its structure drawing and system diagram.  
If a sprinkler is required for cooling down the fuel debris when cutting and for preventing fire caused by Zircaloy cladding tube mixed in the fuel debris, report the method.
- Method of remote attachment on and detachment from the transport equipment  
Study the remote attachment and detachment method with transport equipment (manipulator, remote operated vehicle, etc.) and report the results.
- Method of remote control  
Study the method of remote controlling of cutting equipment (including dust

- collector), and report the results.
- Task solving
  - Study solutions to the issues arising from the above studies, and report the results.
  - If a test is required to solve the task, the testing plan shall also be provided.
- (2) Application to the site
  - Procedure for installation and assembly of cutting equipment.
  - Wiring distance between cutting equipment (including dust collector) and operation point
  - Field visit and identification of the issues to be considered.
- (3) Process, organizational structure and cost for realization of the proposed technology
  - Study of the issues, prospect of the solutions, and development period to realize proposed technology
  - Schedule and organizational structure
    - Report the schedule and organizational structure to apply proposed technology to the site.
  - Cost evaluation
    - Report rough cost estimation for each step below.
    - R&D
    - Design
    - Test manufacturing
    - Test
    - Manufacturing

### 3. Procedures for Proposal of RFP

#### 3.1 Contents to be described in RFP

The proposer shall understand well the contents of “2.2 Assumptions and prerequisites” and “2.3 Goals and Objectives of F/S” and fill out the Forms 1,2, 3(3) and 4. Note that the proposal shall be readable by using conceptual diagram etc.

### 4. Evaluation Criteria for the Proposal and Applied Points

#### 4.1 Evaluation Criteria

Evaluation items (Basic and Additional points) are written in Tables 3-2 and 3-3. Each project is evaluated based on those tables.

Table 3-2 Evaluation Criteria of the Proposal for Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach

Details of the proposal	Basic	Additional	Total
<b>(1) Purpose, Contents, and Implementation Method of the project</b> (Technical evaluation for the details of the project and implementation method is performed based on Table 3-3.)	-	-	-
<b>&lt;Basic points&gt;</b> • The purpose and details of the project correspond with those described in this subsidy application procedure and its details are described.	5	-	5
<b>&lt;Additional points&gt;</b> (N/A)	-	-	
<b>(2) Project Implementation Plan</b>	-	-	-
<b>&lt;Basic points&gt;</b> • Project implementation plan (schedule) is feasible for the purpose and detail of the project.	5	-	
<b>&lt;Additional points&gt;</b> • Project implementation plan (schedule) defines the basis for the applicability of project implementation (manpower, procedures etc.). • Project implementation method defines the know-how to implement the project efficiently.	-	5	10
<b>(3) Project Implementation Scheme</b>	-	-	
<b>&lt;Basic points&gt;</b> • Diagram of implementation scheme and division of roles to implement project corresponds with project contents. • Sufficient human resources are secured for project execution. • The number of persons, scheme, and division of roles are defined.	5	-	10
<b>&lt;Additional points&gt;</b> • Scheme has been developed to respond quickly and flexibly to the requests from the management office of this project. • Scheme has been developed to start the project immediately after the conclusion of the contract.	-	5	
<b>(4) Track Record of Other Projects</b>	-	-	
<b>&lt;Basic points&gt;</b> • Proposer has expertise and know-how etc. essential for execution as an organization.	5	-	
<b>&lt;Additional points&gt;</b> • Technical knowledge, expertise, know-how etc related to the contents of the project as an organization. • Proposer has experience in practical work and network practically useful for the project implementation and organization. • Proposer has experience in the proposed technology and/or the existing technology as a basis for the proposed technology (including feasible idea) as an organization.	-	15	20

<b>(5) Financial basis and Management System</b>	-	-	
<b>&lt;Basic points&gt;</b> <ul style="list-style-type: none"> <li>• Financial basis for implementing this project (system for filing and storing of written evidences for expenditures).</li> <li>• Proposer is capable of stable account processing as a party implementing this project.</li> </ul>	5	-	5
<b>&lt;Additional point&gt;</b> (N/A)	-	0	
<b>Total</b>	25	25	<b>50</b>



Table 3-3 Evaluation Criteria of the Proposal for Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach (Technical)

Details of the proposal	Basic	Add	Total
<b>(1) Basic Principle of Proposed Technology</b> The basic principle of proposed technology is described.	-	-	-
<b>&lt;Basic points&gt;</b> • Structure of proposed technology and/or basic principle of system structure are described in detail.	5	-	10
<b>&lt;Additional points&gt;</b> • Considerations to achieve the target specifications.	-	5	
<b>(2) Specification of Proposed Technology</b> • Specifications of the proposed technology are described. If the proposed technology does not cover all of the items, list the missing item(s). If the proposed technology does not meet the target specification, explain the reason and describe the achievable specification.	-	-	-
<b>&lt;Basic points&gt;</b> • Applicable process and area selected from Table 3-1. • Descriptions for following specifications are concrete and appropriate. *Shape and geometric envelope *Weight *Radiation resistance (dose rate and cumulative dose) *Operation temperature and humidity	5	-	35
<b>&lt;Additional points&gt;</b> • Descriptions for following specifications are concrete and appropriate. *Maximum operation duration *Waterproof and dust-proof performance (if it is operable under water, so state.) *Method of supply power (electric or hydraulic) *Max cutting depth (thickness) *Cutting speed (efficiency) *Availability of fume and dust collection/capturing function and its performance *Material of machinable object *Specification items required other than above • Describe that the proposed technology is superior to the prescribed target specification, and the values are feasible, and also it has high cutting capability. • Describe in detail the main issues in developing the proposed technology and its solutions, which are deemed feasible.	-	30	
<b>(3) Existing Technology as a Basis of Proposed Technology</b> A currently existing technology as a basis of proposed technology and details of the following contents are described.	-	-	-
<b>&lt;Basic points&gt;</b> • Detail of the relations between existing technology as a basis of proposed technology and proposed technology.	5	-	5
<b>Total</b>	15	35	<b>50</b>

Attachment 1 Assumptions and Prerequisites

Table a-1 Assumptions and Prerequisites

Unit to study	<ul style="list-style-type: none"> <li>• Select the unit to study in proposal. It could be all three units (Unit 1 through Unit 3) of Fukushima Daiichi NPS, <u>or</u> a specific unit.</li> </ul>
Scope of study	<ul style="list-style-type: none"> <li>• In principle, entire interior of PCV including RPV where fuel debris seems to exist. If the scope of the study is aimed at fuel debris retrieval of a specific part of the unit, please write clearly.</li> <li>• Scope of the study covers from the start of the initial operation at the unit for fuel debris retrieval (e.g. removal of shield plug) to storing fuel debris in storage canisters and transferring them to the temporary storage.</li> </ul>
On-site operation condition	<ul style="list-style-type: none"> <li>• Assume that the rubble is removed and decontamination work proceeds in 2020 when fuel debris retrieval starts.</li> <li>• PCV/RPV is under high radioactivity and high humidity. Water is dripping due to the continuous water injection.</li> <li>• Water level inside PCV is the same as the current measured or estimated one as of 2014.</li> <li>• No radiation shielding effect by water is counted.</li> <li>• Acceptable maximum load for floor of 1.2 t/m<sup>2</sup> shall be considered when installing and transferring heavy weight objects inside the building.</li> <li>• Visibility inside PCV/RPV is very low due to no lighting provided.</li> <li>• Inside PCV/RPV are densely installed internal structures, of which the original shape might not be preserved.</li> <li>• Assume that air dose rate is 100 Gy/h <u>inside</u> PCV, and 1 kGy/h <u>inside</u> RPV.</li> <li>• For effective air dose rate <u>outside</u> PCV, assume that, after the start of the fuel debris retrieval, air dose rate on the operation floor is 1 mSv/h, 3 mSv/h in operation area other than operation floor and 5 mSv/h in a passageway inside the building.</li> <li>• Use existing opening, hatch, and stairs inside the reactor building for accessing each floor and delivering the equipment to each floor. No new openings, in principle, shall be created on the outer wall of the building. (Seismic resistance and leakage prevention of radioactive materials shall be considered when creating new openings.)</li> <li>• Dimension of equipment to be brought in, in principle, shall meet with the passageway width of 1.2 m and height of 3 m.</li> <li>• Give consideration to the possibility of the accumulation of hydrogen gas inside PCV/RPV when cutting fuel debris or internal structures.</li> <li>• By the start of fuel debris retrieval, a 100-ton type overhead crane is installed and available, and spent fuel in SFP and the equipment in DSP are all cleared off.</li> <li>• Total weight of equipment installed on the operation floor shall be minimized in consideration of seismic safety.</li> <li>• No shielding function or air tight function should be counted for the container covering operation floor in the consideration of the boundary.</li> </ul>
Time schedule*1	<ul style="list-style-type: none"> <li>• Assume that status check of fuel debris inside the PCV is to be executed in 2016 to ensure the feasibility in the fuel debris retrieval.</li> <li>• Assume that status check of fuel debris inside the RPV is to be executed in 2018 to ensure the feasibility in the fuel debris retrieval.</li> <li>• Assume that start of the fuel debris retrieval in 2020.</li> </ul>

\*1. Period required for licensing application and permit need not be considered.

## Attachment 2 The explanatory details of target specification

### 1. Feasibility Study of Visual and Measurement Technology for Innovative Approach

The details of the target specification of Table 2-1 of Exhibit 2 are explained below.

#### (1) Radiation resistance

Status check of the fuel debris etc. is expected to include the processes of approaching the fuel debris and radiated internal structures, and entering into high radiation field where those objects are located. Therefore, the technology is required to be applied to the environment more severe than the current air dose measured inside the PCV<sup>\*1</sup> of Unit 2. The target value of this project was determined based on the assumptions below.

##### a) Radiation resistance (dose rate)

- Status check of the fuel debris etc. (Application area: PCV)

About ten (10) times the air dose currently measured inside the PCV, envisaging the process of entering into the high radiation field where the fuel debris and internal structures are located.

- Status check of the fuel debris etc. (Application area: RPV) and fuel debris retrieval work

Ten (10) times the target value of status check of PCV for fuel debris retrieval, envisaging the work needs to be carried out closer to the radio-activated internal structures.

##### b) Radiation resistance (Cumulative dose rate)

Operation hours to calculate cumulative dose rate are set as follows:

- Status check of the fuel debris etc.

Working day for status check of the fuel debris etc. is one day (24 hours)

- Fuel debris retrieval

Working hours for the fuel debris retrieval are seven days (168h) assuming the longer continuous work is required.

#### (2) Basic shape

A basic shape of the equipment was determined envisaging the insertion of equipment from the existing opening.

\*1 Refer to page 6 of “Contents of Request for Information (RFI) for the Innovative Approach to the fuel debris retrieval on Dec. 17, 2013 (International Research Institute for Nuclear Decommissioning)” in the package of information on RFI for Innovative Approach to the fuel debris retrieval.

### 2. Feasibility Study of Fuel Debris Cutting and Dust Collection Technology for Innovative Approach

The details of the target specification of Table 3-1 of Exhibit 3 are explained below.

#### (1) Radiation resistance

Same as explanation of the target specification of the visual and measurement technology.

#### (2) Material properties of objects

The material properties of fuel debris (Table 3-1 of Exhibit 3) are based on the results of R&D for simulated debris. (Refer to P.14 of IRID’s Presentation for the workshop “Status of R&D for Fuel Debris Retrieval” held in Japan on April 25, 2014. ( URL : [http://irid.or.jp/fd/?page\\_id=352&lang=ja](http://irid.or.jp/fd/?page_id=352&lang=ja))

#### (3) Cutting size

The cutting size is determined based on the capacity of fuel storage container used for TMI-2 (Refer to P.25 of “TMI Fuel Characteristics for Disposal Criticality Analysis (DOE/SNF/REP-084)

Attachment 3 Instructions for applying to the Request for Proposal (RFP) for entities to implement with subsidies the Conceptual Study of Innovative Approach of Fuel Debris Retrieval and Feasibility Study of Essential Technologies

For this Request for Proposal (RFP), all plan proposals must be submitted using the Web Application System which is provided on the RFP information page on our Management Office for the Project of Decommissioning and Contaminated Water Management homepage. Although the applications via e-mail or post are not allowed, hand-carrying may be permitted at the management office's discretion when necessary. If you need to submit the application by hand, please contact us in advance.

\* Incomplete documents will be rejected and not subject to evaluation. Therefore, please carefully read and follow the procedures for application to correctly fill out the documents.

\* Any application documents submitted after the closing date won't be accepted.

The instructions for applying to the RFP are written below. Also please note that the Web Application System cannot save the proposal data temporarily.

0. Please read all the materials including the Guidelines and "Procedural Manual for conducting subsidized projects" carefully before applying.
1. Please download the application forms 1 ~ 4 (Word file). The forms 1 ~ 4 are all required application documents.
2. Form 1 is an application form which must be filled out with the applicant's basic information along with the applicant's signature. Please fill in the necessary information, sign, and scan it into a PDF file.
3. For Form 2 and Form 3, please fill in the plan proposal details as specified in each section.
4. Form 4 is the "Certificate of Conformance to Qualification Requirements" which proves that you are fulfilling the qualification requirements of this subsidy. Please fill in each section as specified.
5. Please check the box "Agree" if you agree to our Privacy Policy on the Web Application System.
6. Please enter the basic information (Applicant information/Contact Person) on the Web Application System.
7. Please select the topic which you are applying for, enter the title of your proposal in English, and then please enter the description of the proposal in English.
8. Please upload the Form 1 PDF file with the applicant's signature, and Forms 2 ~ 4 PDF files with the proposal details as instructed on the Web Application System. Please also upload any supplemental documents for the proposal if you have any. (Two additional PDF files can be submitted.) Please note that submission of supplemental documents is optional.
9. Please upload other documents (1. Company/Organization information, 2. Financial Statement and Income and Expenditure Account Statement, 3. Articles of Incorporation or Articles of Endowment) as PDF files on the Web Application System as instructed.
10. Please click on the confirmation button when you are done entering all the necessary information and uploading the required files. A confirmation e-mail will be sent automatically to the registered address if the submission is completed without any problems. This completes the application procedure. There is no need to make contact with the Management Office by e-mail, etc.
11. If you wish to change or modify the proposal documents after you have submitted them on the Web Application System, please submit the modified documents on the system once again using the system from the beginning. Once you have finished submitting the modified documents, please make sure to notify the Management Office ([retrieval@mri.co.jp](mailto:retrieval@mri.co.jp)) about your re-submission by e-mail. You may modify and submit the documents as many times as necessary until the closing date for applications. Please note that if you do not notify the Management Office regarding the modified documents, then we will consider the latest documents submitted on the system as the final documents.