

**Uttarakhand Science Education & Research Centre (USERC)**  
Department of Science and Technology, Govt. of Uttarakhand  
33/2, Vasant Vihar, Dehradun, Uttarakhand  
Phone: 0135-2760302; Email: [u.serc@redifmail.com](mailto:u.serc@redifmail.com); Web: [www.userc.org](http://www.userc.org)

Advt. No. U-SERC/BRNS/17-18/01

Date: 10.04.2018

### **NOTICE INVITING TENDER**

The Uttarakhand Science Education & Research Centre (USERC) invites sealed tenders for different Radiation Lab Equipments and accessories. The tender document is available on website <http://www.userc.org> (Tender ref: U-SERC/BRNS/ 17-18/01). The last date of receipt of bids by registered post/courier is **01.05.2018 upto 14:00 hrs.**

Director

USERC, Dehradun



## Uttarakhand Science Education & Research Centre (USERC)

33/2, Vasant Vihar, Dehradun

Phone: 0135-2760302 E-mail: [u.serc@rediffmail.com](mailto:u.serc@rediffmail.com)

Ref: U-SERC/ BRNS/17-18/01

Dated: 10 April 2018

### TENDER NOTICE

Sealed tender bids are invited from reputed manufacturers/agencies, having a minimum experience of two years in the field of radiation instruments, for the following equipments/items:-

#### Radiation Instruments

Tender No.	Item(s)	EMD (Rs.)
<b>USERC/BRNS/2017-18/01</b>	1. Gamma pocket survey meter	<b>3% of the total rate quoted</b>
	2. Global Positioning System	
	3. Deposition progeny sensor	
	4. Double Distillation Plant	
	5. Etching Bath & Counting Unit	
	6. Pinhole cup dosimeter	
	7. Radon surface/mass exhalation chamber	
	8. Water sampling kit & bubbler	
	9. Wire- Mesh capped progeny sensors	
	10. Radon & Thoron Monitor with its accessory	

Tender document(s) containing terms and conditions and technical specifications are available and can be downloaded from the USERC website [www.userc.org](http://www.userc.org). The tender documents fee is Rs. 1000/= for each tender (non-refundable). The tender documents fee and Earnest Money Deposit (EMD) have to be deposited through separate Demand Drafts (DD), in favor of the Director, Uttarakhand Science Education & Research Centre (USERC), payable at Dehradun, and have to be enclosed with the duly filled Technical Bid. All the instructions, terms and conditions, specifications, bid formats, etc. are available with the Tender Document(s). The tender document fee is payable to all.

The sealed tender bids duly completed in all respects, along with necessary documents, should reach to **Director USERC 33, VASANT VIHAR, PHASE-II, DEHRADUN- 248006** latest by the date **01 May 2018 till 14:00 hrs**.

The Technical Bids so received, shall be opened on **01 May 2018 at 15:00 hrs** in the USERC office, Dehradun, Uttarakhand, in the presence of the representatives of the suppliers those wish to be present. Subsequently, only the financial bids of eligible renderers shall be opened on the same date. **Director/Purchase Committee for the purpose has the right to reject any or all tenders, without assigning any reason thereof.**

**Important Dates:**

Last date of receiving sealed Bids	<b>Dated: 01 May 2018 till 14:00 hrs</b> In the office of The Director Uttarakhand Science Education and Research Centre (USERC), 33 Vasant Vihar, Phase II, Dehradun -248006
Date of Opening of Technical Bids, if minimum three vendors participate	<b>01 May 2018 at 15:00 hrs</b> In the office of Uttarakhand Science Education and Research Centre (USERC), 33 Vasant Vihar, Phase II, Dehradun -248006
Date of Opening of Financial Bids	<b>01 May 2018</b> Subsequently after the opening and scrutinizing the technical bids.

For latest information or updates, please visit USERC < [www.userc.org](http://www.userc.org)>.

**Attached Document: Tender Documents for Radiation Instruments**

Note: Suppliers quoting the rates for all the items will be considered only.

Director, USERC



**Uttarakhand Science Education & Research Centre (USERC)**  
**33/2, Vasant Vihar, Dehradun**  
Phone: 0135-2760302 E-mail: [u.serc@rediffmail.com](mailto:u.serc@rediffmail.com)

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Ref: U-SERC/BRNS/ 17-18/01

Dated: 10 April 2018

**Document fee: Rs. 1000 (non-refundable)**

## **Radiation Instruments**

**Tender No.:** USERC/BRNS/2017-2018/01

**Dated:** 10 April 2018

### **Tender Document**

**Part- A: Terms and Conditions**

**Part- B: Technical Bid (Format)**

**Part- C: Financial Bid (Format)**

**Part- D: Specifications**



## Uttarakhand Science Education & Research Centre (USERC)

33/2, Vasant Vihar, Dehradun

Phone: 0135-2760302 E-mail: [u.serc@rediffmail.com](mailto:u.serc@rediffmail.com)

Ref: U-SERC/BRNS/ 17-18/01

Dated: 10 April 2018

### Tender Document

#### Part- A : Terms & Conditions

##### General:

1. The Director/Purchase Committee for the purpose reserves the right to reject any or all the tenders without assigning any reason thereof. Conditional tenders shall not be accepted.
2. Duly filled tender documents in sealed covers super-scribed "**Tender for Radiation Instruments**" should reach to **Director USERC 33 VASANT VIHAR, PHASE 2, DEHRADUN-248006** on or before the last date. Tender documents that do not provide complete information and that are received after the specified date and time will not be considered and will be summarily rejected. The department will not be responsible for any postal delay.
3. Sealed Tenders should be submitted in two-bid system consisting of Technical Bid (**Part-B** of the tender document), and Financial Bid (**Part-C** of the tender document). Duly filled  
**Technical Bid and Financial Bid should be submitted separately in two different sealed envelopes kept within one sealed envelope.** The "Technical Bid" or "Financial Bid" should be clearly written on the corresponding sealed envelopes, both kept within the sealed single envelop, super-scribed "**Tender for Radiation Instruments**".
4. The amount of total earnest money should be equal to the sum of the amounts of earnest money (@ 3% ) of the items for which tender has been placed. The DD of EMD has to be enclosed with the duly filled Technical Bid.
5. The purchase committee reserves the right to change any item or quantity of item(s) without prior intimation to the tenderer.
6. Rates should indicate all taxes and installation charges F.O.R. the The Director USERC, Uttarakhand Science Education and Research Centre, Dehradun. USERC will not supply "C" or "D" form.
7. Tenderer should produce authorization certificate of the Manufacturing Company/Firm represented by him/her.
8. It is essential to enclose make/company name/model No. and other specifications/product catalogue/manual, etc. of the items tendered.
9. After finalization of the purchase order to the successful tenderer, the EMD will be refunded, preferably within two months, to the unsuccessful tenderers without any interest. However, the EMD of the successful tenderer will be kept as Security deposit.
10. Successful bidder shall have to deposit Performance Security 5% of the quoted price in the form of Bank Guaranty or a Demand draft drawn from any nationalized bank in the favor of 'The Director, Uttarakhand Science Education and Research Centre (USERC), Dehradun -248006 payable at Dehradun on submission of which the Security money of the successful bidder will be refunded. Purchase order will be issued only after the

Performance Security is received from the successful tenderer. The Performance Security will be refunded, without interest, after successful completion of the warranty period. The Performance Security has to be deposited within two week from the date on which tender is approved, otherwise the approval will shift in the favor of the second lowest tenderer and so on, up to the tenderer who otherwise fulfills all conditions.

11. The supplier, ordered to supply the equipment(s)/item(s), has to supply, install and demonstrate the equipment(s) within **two months** from the date of issue of purchase order, failing which the Performance Security will be forfeited; and the purchase committee may cancel the purchase order in full, or part, and re-allot the same to next lowest tenderer who otherwise fulfills all conditions.
12. The bills of the suppliers shall be paid by the USERC after all the materials/articles/equipments have been received, installed, inspected and operational training of the instruments/equipment(s) has been performed, and verified by the purchase committee.
13. The equipments should be of said specifications and have at least **two year** warrantee. The tenderer shall specify after sales service facilities within the Guarantee/Warranty period. The warrantee period will be extended for the period by which the equipment(s)/instrument(s) remain out of order during warrantee period.
14. Non-compliance of the terms and conditions or breach of contract will result in forfeit of deposited EMD/Security deposit/Performance security.

#### **Term & Conditions of Supply:**

1. The last date and time for the acceptance of the bids **01 May 2018, till 14:00 hrs.**
2. Tenderers shall submit the following documents along with the Technical bid.
  - a) Income Tax/Sales Tax clearance certificate from the office concerned, certifying that the tenderer has cleared all the tax dues.
  - b) The suppliers should state whether they are a Proprietary Firm, Partnership Firm or Private/Public Limited Company and furnish the proof of the same.
  - c) The names of the organizations and laboratories, if any, to which similar equipment(s) have been supplied.
  - d) Certificate of registration of firm (Registration No.).
  - e) Technical specifications offered by the Supplier.
  - f) Proprietary certificate, if any.
3. The rates should be mentioned in the **Part C - Financial bid** attached with the Tender Document. Each page of the tender shall be signed in full and stamped with the seal by the supplier. The supplier must clearly state in what capacity he or she is signing the tender.
4. The Technical Bid shall be opened first to ensure that supplier(s) has (have) submitted all the requisite documents. If the Technical Bid is not in order or is deficient in some respect, the Financial Bid of such tenderer shall not be opened.
5. Tender bids, not accompanied by the requisite amount of tender document fee and Earnest Money Deposit, are liable to be rejected.
6. Supplier should read carefully all the instructions and terms and conditions, etc., before registering rates in prescribed schedule of the tender. Taxes and duties etc. should be shown separately and clearly.
7. The Technical Documents shall be opened only if **at least three Vendors** have participated. The tenderers or their authorized representatives shall be allowed to be present at the time of opening of the tenders. Subsequently, only the financial bids of qualified tenderers shall be opened.

8. In case of imported items/equipments/components, the rates should be quoted in the light of exemptions enjoyed by educational institutions, as per the Department of Scientific & Industrial Research (DSIR), Govt. of India norms. Certificate for that effect shall be provided.
9. Technical Specifications of the instruments/equipments are given in **Part D - Specifications** of the tender document.
10. The delivery, installation and operational training of the instruments/equipment should be completed within three months from the date of placing the order. No extension shall be granted to the contractors/suppliers for the period of delivery.
11. If the supplier fails to deliver the article(s) as per the delivery schedule, USERC shall be free to procure the balance/undelivered supply, at the risk and cost of the supplier, from other such suppliers.
12. The goods, articles, material supplied by the supplier shall be accepted after inspection. No articles/materials, which do not confirm to the specifications laid down in the terms & conditions or damaged in transit, are acceptable.
13. Supplier(s) shall be responsible for the supply and installation of equipment(s) at the destination. The cost towards insurance, etc., until destination, shall be borne by the supplier(s).
14. The basic operator training should be provided by the competent Engineer during the time of installation.
15. Charges for AMC after warranty period for next three years (minimum 2 visits per year) should be clearly mentioned separately as optional item. A list of all the necessary accessories required to make the unit(s) functional should be provided. Names and phone numbers of the persons responsible for Sales and Service for this territory should be mentioned.
16. Printed Terms and Conditions on letter heads or Quotation form of tenderers shall not be applicable.
17. The contract/Purchase order shall be governed by the Laws of India for the time being in force. All disputes or differences arising out of this contract shall be subject to the exclusive jurisdiction of court of Dehradun only.
18. USERC does not bound itself to acceptable lowest tendered rates and reserve the right to accept/reject any or all tenders or its part thereof. It also reserves the right to increase or decrease the quantity without giving any reason.
19. The earnest money deposited will be forfeited by the order of Director, USERC, if the tenderer fails to execute the order.
20. USERC reserves the right to take any such action(s) as may fit against the supplier in case of failure on the part of the tenderer for fulfilling the contract apart from forfeiture of earnest money.
21. In any case NO ADVANCE PAYMENT shall be made.
22. Conditional offers having conditions other than those specified here in shall not be considered and will be treated as invalid.

Director, USERC

## **PART- B : Technical Bid (Format)**

**Tender No.: USERC/BRNS/2017-18/01**

**Dated: 10 April 2018**

- (Note:** 1. Tenderers are advised to read carefully the Terms and Conditions of supply before recording the rates in this schedule.  
2. No erasures or over writing shall be allowed, unless they are authenticated under the full signature and the seal of the tenderer.  
3. The rates shall be F.O.R. destination).

### **Technical Bid (should consist of)**

1. Name of the Firm .....
2. Address of the Firm with phone number, fax No., E-mail, etc . .....  
.....  
.....
3. Certificate of Registration of firm (Mention number) .....
4. Technical specifications/make/model of the items being offered by the firms along with Brochures and literature giving all features of the items.
5. Sales Tax number and clearance certificate (attach proof):
6. PAN/Income Tax Clearance certificate/TIN No. (Attach proof):
7. Delivery Period:
8. Warranty:
9. Discount offered:
10. Post Warranty AMC:
11. List and No. of enclosures:

Signature of the Tenderer  
With Seal of the Firm



## **PART- C : Financial Bid (Format)**

**Tender No.: USERC/BRNS/2017-18/01**

**Dated: 10 April 2018**

- (**Note:** 1. Tenderers are advised to read carefully the Terms and Conditions of supply before recording the rates in this schedule.  
2. No erasures or over writing shall be allowed, unless they are authenticated under the full signature and the seal of the tenderer.  
3. The rates shall be F.O.R. destination).

### **Financial Bid (should consist of)**

1. Name of the Firm .....
2. Address of the Firm with phone number, fax No., E-mail, etc.  
.....  
.....
3. Validity period of Tender:
4. Format for submitting the financial bid

S. No.	Description of goods with details of specifications	Quantity	Price/Rate per Unit (Rs.)	Taxes (Rs.) (please specify)	Total Cost (Rs.)
1.	Gamma pocket survey meter	01			
2.	Global Positioning System	01			
3.	Deposition progeny sensor	200			
4.	Double Distillation Plant	01			
5.	Etching Bath & Counting Unit	01			
6.	Pinhole cup dosimeter	200			
7.	Radon surface/mass exhalation chamber	01			
8.	Water sampling kit & bubbler	01			
9.	Wire- Mesh capped progeny sensors	200			
10.	Radon & Thoron Monitor with its accessory	01			

\* Prices quoted should be figures and words.

Signature of the Tenderer  
With Seal of the Firm

## **PART- D : Specifications**

**Tender No.:** USERC/BRNS/2017-18/01

**Dated:** 10 April 2018

### **1. Specifications for GPS device**

<b>Physical &amp; Performance:</b>	
Unit dimensions, WxHxD:	not more than 7 x20 x 4 cm
Display size, WxH:	at least 4 x 5.5 cm
Display resolution, WxH:	160 x 240 pixels
Display type:	transflective, 65-K color TFT
Weight:	less than 275 g with batteries
Battery:	2 AA batteries
Battery life:	20 hours or higher
Waterproof:	yes (IPX7)
High-sensitivity receiver:	yes
Interface:	high-speed USB and NMEA 0183 compatible
<b>Maps &amp; Memory:</b>	
Base map:	yes
Ability to add maps:	yes
Built-in memory:	At least 1.5 GB
Compatible data cards:	microSD™ card
Waypoints/favorites/locations:	More than 2000
Routes:	More than 200
Track log:	More than 10,000 points, 200 saved tracks

## 2. Specifications for pocket Gamma survey meter:

Application	Gamma exposure meter for wide range gamma dose rate
Detector	Geiger-Muller counter
Measurement range	0.01 $\mu$ Sv/h – 130 mSv/h
Energy range ( + 30%)	0.04 – 3 MeV
Operating condition Temp: RH :	-10 to 50 °C Upto 95% at 35 °C
Weight	not more than 300 gm
Size	not more than 150 X 100 X 50 mm
Power requirement	Battery operated
Battery life	Typically six months
Communication with computer	USB interface

## 3. Specifications of passive equipment

### 3.1 Technical data of the pin holes type twin cup dosimeters

- Simultaneous measurement of radon and thoron using LR-115 (type-II) detector
- Single entry face for both radon and thoron diffusion.
- Discrimination of radon/thoron should be carried out by pin-holes. No additional membrane should be required for radon-thoron discrimination. Thoron entry into the radon chamber through pin-holes should be within 2 %.
- Material: Light weight plastic such ABS with inside metal coating
- Materials should be free from radon/thoron absorption
- Outside coating by a decorative colour preferably wooden
- Easy fixing metal holder for LR-115 detectors of minimum size of 3 cm x 3 cm with suitable number of pin holes for thoron cut off.

- Provision for dosimeter numbering as per user request
- Sensitivity should be at least  $0.017 \text{ track/cm}^2/\text{day}/(\text{Bq/m}^3)$  for radon and  $0.01 \text{ track/cm}^2/\text{day}/(\text{Bq/m}^3)$  for thoron detection
- Proper sealing should be provided at each threading using Neoprene 'O' ring. Maximum allowable leakage in sealed condition is  $0.0005 \text{ h}^{-1}$
- Deployment arrangement: vertically with chain lock system at top with gas entry face downward
- Design should be approved by RP&AD, BARC

### **3.2 Fabrication of the badge-holders for DTPS/DRPS**

#### **Specifications:**

1. The badge should be of dimensions  $\sim 6\text{cm} \times 3 \text{ cm}$ .
2. It should have two slots to accommodate two detectors each of dimension  $3 \times 3 \text{ cm}^2$ .
3. The badge should have two parts. The lower part should have a clip for suspension. The upper part should have two brackets to make the detector grip tight.
4. The material of the badge should be acrylic/hard plastic.
5. The weight should be  $\sim 20 \text{ gms}$ .

### **3.3. Fabrication of the Wire-mesh capped holders for Direct Thoron Progeny Sensor (DTPS) and Direct Radon Progeny Sensor (DRPS)**

#### **Specifications:**

1. The Wire-mesh capped holder will have two parts.
2. The upper part will have two sections having wire-mesh, such that each section will have the dimension of  $22 \times 22 \text{ mm}^2$ .
3. The total dimension of the upper part will be: length 66 mm, thickness 12 mm, breadth 34 mm.
4. The base will have dimensions: length 66 mm, thickness 2 mm, breadth 34 mm.
5. The distance between the wire-mesh and the detector should be 1 cm.
6. The upper part should fit in tightly on the base.
7. The material of the badge should be acrylic/hard plastic.
8. A clip should be fitted at the back-side of the base to use it as personal dosimeter.
9. The weight should be  $\sim 20 \text{ gms}$ .

### **3.4. Fabrication of integrated sampler (DTPS/DRPS WL monitor)**

#### **Specifications:**

1. The material of the sampler should be light metal/aluminium.
2. One end of the sampler should be open-faced and the other end should be close-faced for attachment to pump.

3. Distance between the wire-mesh and the detector and that between the Filter-paper and the detector should be 3 mm.
4. The diameter of the sampler should be ~5.5 cm, and height ~1.5 cm.

#### 4. Technical Specification of Spark Counter

Detector Type	Solid State Nuclear track detector
Count Capacity	99999 counts
Count Display	On the LCD display
Dead Time	Less than 10 $\mu$ for spark registration Sparking Head area = 1 Sq.cm( $\pm$ 0.1% accuracy)
EHT Range	100 Volts to 1000 volts, user settable
EHT Display	4 Digit display on LCD Module
EHT Setting	Independent setting of Pre-sparking & counting Voltage through keys using two digital potentiometers
Counting Gate/Window time	1 to 10 sec. User –settable through keys
Display	32 character backlit LCD Module
Parameters Displayed	Counts and EHT
Operating Keys	5 Nos.
Data Transfer	Through RS 232 serial port for data transfer to a PC
Downloading Software	Provided on a CD
Power	Mains 230 V AC $\pm$ 10%
Dimensions	23 cm x 20 cm x 28 cm
Accessories	Microprocessor based control system

## ***5. Specification of Constant Temperature Water Bath:***

- Heating: 5 to 99 °C
- Dimension : not more than 20x15x10 cms
- Voltage (V) : 170 - 240.0 V AC
- Rating (Watt) : 2.0
- Accuracy in (°C): ±0.5

## **6. Specifications of radon-thoron monitor and accessories**

### 6.1. SPECIFICATIONS OF PORTABLE RADON-THORON MONITOR

1. Detector type : ZnS:Ag scintillation detector
2. Scintillation volume : ~ 0.15 L
3. Sensitivity : > 1 CPH/(Bq/m<sup>3</sup>) for Radon  
> 0.7 CPH/(Bq/m<sup>3</sup>) for Thoron
4. Sampling type : Both Diffusion and Flow with interchangeable sampler
5. Sampling pump : Inbuilt noiseless pump with Auto / manual control of power to pump
6. Sampling volume : 0.5 to 1 L/min
7. Measured quantity and its measurement interval : Radon mode : User selectable 15 / 60 min  
Thoron mode : User selectable 15 / 30 / 60 min  
Alpha mode : User settable 1 to 999 min
8. Response time for Radon and thoron measurement : 95% of radon value is to be attained within an hour  
95% of Thoron value is to be attained within 5 minutes
9. Minimum detection limit : 15 Bq/m<sup>3</sup> at 1  $\sigma$  and 1 h cycle for radon / thoron
10. Upper detection limit : 10 MBq/m<sup>3</sup>
11. Thoron interference in radon : < 5% with sniffing mode of sampling
12. Display : LCD touch screen display indicating the current measurement process and also capable of displaying the past measurements with a on-screen key press during on-going measurement.
13. Date storage memory : Memory with storage capacity of at least 30,000 readings
14. Data communication : 2-wire RS 485 data communication with USB data port at PC end.
15. Inbuilt sensor : Temperature and Relative humidity sensor inside monitor
16. Operating power : Internal DC Battery operated with backup up to 30 hr  
Continuous use with 110- 240 V AC 50 Hz main supply.
17. Dimension and weight : portable equipment having dimensions within 35 cm x 20 cm x 14 cm and weight less than 4 Kg

18. Carrying case : Instrument carry case with sufficient cushioning for safe transport of equipment during field use.
19. Software : PC end software with following functions & features:  
 RS485 based data communication with radon monitor  
 Display of current readings and trend from multiple units  
 Data downloading in online and offline mode  
 Long distance data communication range  
 Remote operation of radon monitor through software

**6.2 Accessory name:**

**Mass exhalation chamber**

Used for: To measure radon mass exhalation rate (per unit mass) /thoron surface exhalation rate (per unit exposed surface area) from Powder samples

Internal dimensions: 100 mm Diameter X 50 mm height

Volume: 0.4 Litre

Sampling: Both diffusion and flow mode

Lid sealing to chamber: Threaded

Lid sealing to detector: Threaded compatible to SRM detector and flow mode sampling lid.

Material: Aluminium

Flow mode sampler: Threaded disc with two 5 mm nozzles (or std. size)

**6.3 Accessory name :**

**Radon accumulator**

Used for: To measure in situ radon flux (per unit area of ground surface) from ground.

Internal dimensions: 200 mm Diameter X 105 mm height

Volume: 3 Litre

Surface area: 314 cm<sup>2</sup>

Sampling: Both diffusion and flow mode

Connection to detector: Threaded compatible to SRM detector

Material: Aluminium double walled

Flow mode sampler: Threaded disc with two 5 mm nozzles (or std. size)

**6.4. Accessory name:**

**Water Bubbler Kit**

Used for: To measure radon/thoron dissolved in water/liquid sample (per unit liquid volume)

Kit contents: sampling bottles – 10 nos,  
 Bubbler – 2 Nos.  
 500 ml capacity syringe with 10 cm long nozzle – one No.  
 packed in a hard carry case

Sample capacity: 50 ml

Head space volume: 50 ml

Material: Borosilicate glass

<b>6.5. Accessory name:</b>	<b>Soil probe</b>
Used for:	To measure in-situ radon/thoron in pore space of soil.
Probe length	1 meter
Hammering tool:	500 gm hammer.
sampling connector	5 mm size nozzle – one No.
probe handle:	detachable handle for removing the probe from ground
Material:	Hard S.S.

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<b>6.6. Accessory name:</b>	<b>Thoron accumulator</b>
Used for:	To measure in situ thoron flux (per unit area of surface)
Internal dimensions:	60 mm Diameter X 40 mm height
Volume:	100 ml approx.
Surface area	28 cm <sup>2</sup>
Sampling	flow mode by two nozzles attached on the chamber walls at 2 cm and 4 cm from bottom and opposite to each other.
Insertion depth mark:	Marking at one cm height along perimeter for indicating insertion depth of accumulator in soil.
Material:	Aluminium
Sealing on surface	Soft gasket (removable) at edge for mounting on plane surface

<b>6.7. Accessory name:</b>	<b>Geo station for continuous radon emission measurement</b>
Used for:	Radon anomaly detection by measuring in situ radon flux (per unit area of ground surface) from ground continuously.
Power	solar powered with battery back up
Sampling	Both diffusion and flow mode
Material:	Stainless Steel
Pressure relief vent:	0.5 inch size auto shut-off valve connection ( 2 Nos)

## 7. Specifications of Radon Mass/Surface Exhalation Chambers

The radon Mass/Surface Exhalation Chamber should be compatible with Online Radon Monitor of given specifications.

Used for:	To measure in situ radon flux (per unit area of ground surface) from ground.
Internal dimensions:	200 mm Diameter × 105 mm height
Volume:	3 Litre
Surface area	314 cm <sup>2</sup>
Sampling	Both diffusion and flow mode
Connection to detector:	Threaded compatible to SRM detector
Material:	Aluminium double walled
Flow mode sampler:	Threaded disc with two 5 mm nozzles (or std. size)
Pressure relief vent:	6 mm size auto shut-off valve connection Pressure bag: 250 ml
volume polymer bag	(100 mm × 150 mm)

## 8. Specifications of Radon Accumulator/Flux Chamber

The Radon Accumulator/Flux Chamber should be compatible with Online Radon



Monitor of given specifications.

Used for: To measure radon mass exhalation rate (per unit mass) /thoron surface exhalation rate (per unit exposed surface area) from Powder samples

Internal dimensions: 100 mm Diameter × 50 mm height

Volume: 0.4 Litre

Sampling Both diffusion and flow mode

Lid sealing to chamber: Threaded

Lid sealing to detector: Threaded compatible to SRM detector and flow mode sampling lid.

Material: Aluminum

Flow mode sampler: Threaded disc with two 5 mm nozzles (or std. size)

## 9. Water Sampling Kit & Bubbler

Used for: To measure radon/thoron dissolved in water/liquid sample (per unit liquid volume)

Kit contents sampling bottles – 10 nos,  
Bubbler – 2 Nos.  
500 ml capacity syringe with 10 cm long nozzle – one No.

Sample capacity: 50 ml

Head space volume: 50 ml

Material: Borosilicate glass

(For any further clarification on the design of different components of the system(s) please feel free to contact **The Director USERC, Uttarakhand Science Education and Research Centre, Dehradun-248006**, at phone No. 0135-2760302; Email: [u.serc@rediffmail.com](mailto:u.serc@rediffmail.com); or P.I. Dr. O. P. Nautiyal Mobile: 8193099191; Email: [nautiyal\\_omprakash@yahoo.co.in](mailto:nautiyal_omprakash@yahoo.co.in)).