



## Design Assessment Form for Nuclear Substance Laboratories and Nuclear Medicine Rooms

The following pages may be detached from the guide and mailed in as part of the licence application.

|            |                                                       |  |  |
|------------|-------------------------------------------------------|--|--|
| <b>A</b>   | <b>General Information</b>                            |  |  |
| <b>A1</b>  | <b>Organization Name:</b>                             |  |  |
| <b>A2</b>  | <b>Licence Number (if applicable):</b>                |  |  |
| <b>A3</b>  | <b>Contact Person:</b>                                |  |  |
| <b>A4</b>  | <b>Contact Telephone Number:</b>                      |  |  |
| <b>A5</b>  | <b>Contact E-mail:</b>                                |  |  |
| <b>A6</b>  | <b>Classification of Rooms covered by this form:</b>  |  |  |
| <b>A7</b>  | <b>Building Name:</b>                                 |  |  |
| <b>A8</b>  | <b>Room Numbers covered by this form:</b>             |  |  |
| <b>A9</b>  | <b>Reviewed by (signature of person responsible):</b> |  |  |
| <b>A10</b> | <b>Approved by (signature of person responsible):</b> |  |  |

(Note: A separate form should be completed for each room unless they are to be of similar design and function and of the same classification).

|            |                                                                                                          |
|------------|----------------------------------------------------------------------------------------------------------|
| <b>A11</b> | <b>Description of the work to be carried out in the room: <i>(Attach separate page if necessary)</i></b> |
|            |                                                                                                          |
|            |                                                                                                          |
|            |                                                                                                          |
|            |                                                                                                          |
|            |                                                                                                          |
|            |                                                                                                          |
|            |                                                                                                          |

Every effort should be made to meet the guidelines set out in this form as they are all good laboratory practices. Alternatives that provide an equivalent degree of safety will be reviewed.

High level and containment level laboratories and nuclear medicine rooms have additional considerations and certain items (i.e., dose estimates) are related only to those classifications. Additional information may be requested by the CNSC after the initial assessment.

| <b>B</b> | <b>Finishing and Fixtures (for use and storage areas)</b>                                                                                                                                                  | <b>Yes</b> | <b>No</b> | <b>Justification for variance included as separate attachment</b> |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|-------------------------------------------------------------------|
| B1       | Flooring will have an impervious, chemical resistant, washable surface. Carpeting will not be used.                                                                                                        |            |           |                                                                   |
| B2       | Either all joints in the flooring material will be sealed, or the flooring will be a one-piece design.                                                                                                     |            |           |                                                                   |
| B3       | Flooring will have a strippable coating for easier clean-up if contaminated.                                                                                                                               |            |           |                                                                   |
| B4       | Flooring will be covered up walls and cabinets to prevent spills from penetrating underneath them.                                                                                                         |            |           |                                                                   |
| B5       | Work surfaces will have a smooth, impervious, washable, and chemical-resistant finish.                                                                                                                     |            |           |                                                                   |
| B6       | Either all joints on work surfaces will be sealed, or bench tops will have a seamless one-piece design.                                                                                                    |            |           |                                                                   |
| B7       | The countertop will include a lip to prevent run-off onto the floor. If the countertop abuts a wall, it will either be coved or have a back-splash against the wall.                                       |            |           |                                                                   |
| B8       | All cupboards and shelving where nuclear substances may be stored will have a smooth, impervious, washable, and chemical-resistant finish.                                                                 |            |           |                                                                   |
| B9       | Walls will be finished with a smooth and washable surface and the joints will be sealed where applicable, for easier clean-up if contaminated due to backspray from a vial or some other such event.       |            |           |                                                                   |
| B10      | The ceiling will be finished with a smooth and washable surface and the joints will be sealed where applicable, for easier clean-up if contaminated due to backspray from a vial or some other such event. |            |           |                                                                   |
| B11      | If necessary, work surfaces will be reinforced to bear the (possibly considerable) weight of any shielding material that may be placed on the work surface.                                                |            |           |                                                                   |
| B12      | A separate hand washing sink and a wash-up/disposal sink will be provided.                                                                                                                                 |            |           |                                                                   |
| B12      | Hand washing sinks will be close to the room's entrance, to encourage hand washing on the way out of the room.                                                                                             |            |           |                                                                   |
| B14      | Sinks will be made of material that is readily decontaminated.                                                                                                                                             |            |           |                                                                   |
| B15      | Each sink will have an overflow outlet.                                                                                                                                                                    |            |           |                                                                   |
| B16      | Faucets will be operated by means not requiring direct hand contact.                                                                                                                                       |            |           |                                                                   |
| B17      | An emergency eye-wash station will be provided in the room or in close proximity to the room.                                                                                                              |            |           |                                                                   |
| B18      | An emergency shower will be provided in close proximity to the room, for use in the event of major personnel contamination.                                                                                |            |           |                                                                   |
| B19      | Emergency lighting will be provided within the room.                                                                                                                                                       |            |           |                                                                   |
| B20      | Facilities for storing outer garments and personal items will be provided outside the room.                                                                                                                |            |           |                                                                   |
| B21      | Coat hooks will be provided within the room, close to the room entrance, to encourage personnel to remove potentially-contaminated lab coats before leaving the room.                                      |            |           |                                                                   |

|          |                                                                                                                                                                     |            |           | Justification for variance included as separate attachment |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|------------------------------------------------------------|
| <b>C</b> | <b>Plumbing</b>                                                                                                                                                     | <b>Yes</b> | <b>No</b> |                                                            |
| C1       | Drains that may carry radioactive material from the area will go directly to the main building sewer or to the facility's controlled active liquid waste system.    |            |           |                                                            |
| C2       | Drains from the room will be identified on plans supplied to maintenance personnel.                                                                                 |            |           |                                                            |
| C3       | Drains will be constructed of chemical-resistant material.                                                                                                          |            |           |                                                            |
| C4       | A backflow protection device will be in place to prevent potentially contaminated water from entering the public water system.                                      |            |           |                                                            |
| C5       | Drain lines that may carry radioactive material will be marked at 3 meter intervals with the radiation warning symbol to indicate the possibility of contamination. |            |           |                                                            |
| C6       | Sink drain traps will be accessible for monitoring.                                                                                                                 |            |           |                                                            |
| C7       | Faucets with vacuum or cooling line attachments will include backflow protection devices.                                                                           |            |           |                                                            |

|          |                                                                                                                                                                                          |            |           | Justification for variance included as separate attachment |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|------------------------------------------------------------|
| <b>D</b> | <b>Security</b>                                                                                                                                                                          | <b>Yes</b> | <b>No</b> |                                                            |
| D1       | An access control system (key, keypad, key fob, other) will be in place to ensure that only authorized users can enter the restricted room.                                              |            |           |                                                            |
| D2       | The room will be equipped with lockable doors that will remain closed and locked whenever nuclear substances and radiation devices are present in the room and the room is unoccupied.   |            |           |                                                            |
| D3       | Any windows on the ground floor will be secured to prevent unauthorized access to the room.                                                                                              |            |           |                                                            |
| D4       | If the room is to be shared with workers not authorized to use nuclear substances, a secondary lockable storage area (refrigerator, freezer, cupboard) will be provided within the room. |            |           |                                                            |

| E                                                                                                                                                                                                                                                                                                                                        | Ventilation                                                                                                                                                                                                                                 | Yes | No | Justification for variance included as separate attachment |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|------------------------------------------------------------|
| <b>Note:</b> This section is to be completed only if volatile nuclear substances are to be used or stored, or if aerosols or gases are likely to be produced. If Biological Safety Cabinets, glove boxes, or “hot cells” are deemed necessary for the work being performed, detailed information should be provided about these systems. |                                                                                                                                                                                                                                             |     |    |                                                            |
| E1                                                                                                                                                                                                                                                                                                                                       | The room will be at negative pressure with the surrounding area (unless the room will be used as a clean or sterile room). Air flow will always be from the area of low radiation. For clean or sterile rooms, an anteroom may be required. |     |    |                                                            |
| E2                                                                                                                                                                                                                                                                                                                                       | General laboratories will have a minimum of 6 air changes per hour.                                                                                                                                                                         |     |    |                                                            |
| E3                                                                                                                                                                                                                                                                                                                                       | The fume hood will be selected based on its adequacy for the intended work.                                                                                                                                                                 |     |    |                                                            |
| E4                                                                                                                                                                                                                                                                                                                                       | Air vented through the fume hood will be vented without recirculation.                                                                                                                                                                      |     |    |                                                            |
| E5                                                                                                                                                                                                                                                                                                                                       | Fume hoods will be located away from areas of air currents or turbulence (high traffic areas, doors, operable windows, air supply diffusers).                                                                                               |     |    |                                                            |
| E6                                                                                                                                                                                                                                                                                                                                       | Fume hoods will not be located adjacent to a single means of access to an exit, due to possible volatility of the fume hood contents.                                                                                                       |     |    |                                                            |
| E7                                                                                                                                                                                                                                                                                                                                       | To avoid interference, supply air vents will be installed away from, or directed away from, fume hoods.                                                                                                                                     |     |    |                                                            |
| E8                                                                                                                                                                                                                                                                                                                                       | If a fume hood is the sole means of room air exhaust, a bypass will be installed to ensure ventilation when the sash is closed.                                                                                                             |     |    |                                                            |
| E9                                                                                                                                                                                                                                                                                                                                       | The fume hood will be constructed of smooth, impervious, washable, and chemical-resistant material.                                                                                                                                         |     |    |                                                            |
| E10                                                                                                                                                                                                                                                                                                                                      | The fume hood will have a means of containing a minor spill.                                                                                                                                                                                |     |    |                                                            |
| E11                                                                                                                                                                                                                                                                                                                                      | The interior of the fume hood will have coved corners for easy decontamination and clean-up.                                                                                                                                                |     |    |                                                            |
| E12                                                                                                                                                                                                                                                                                                                                      | The work surface of the fume hood will be reinforced to bear the weight of any shielding material that is required.                                                                                                                         |     |    |                                                            |
| E13                                                                                                                                                                                                                                                                                                                                      | Fume hoods will be labelled to show which fan or ventilation system they are connected to.                                                                                                                                                  |     |    |                                                            |
| E14                                                                                                                                                                                                                                                                                                                                      | The face velocity of the fume hood will be at a minimum of 0.5 m/s.                                                                                                                                                                         |     |    |                                                            |
| E15                                                                                                                                                                                                                                                                                                                                      | Each fume hood will have a continuous monitoring device for proper functioning of the hood. An alarm, either visual or audible, will be present to indicate reduced air flow.                                                               |     |    |                                                            |
| E16                                                                                                                                                                                                                                                                                                                                      | Prior to use, the fume hood will be tested to verify flow rate and the absence of counter-currents.                                                                                                                                         |     |    |                                                            |
| E17                                                                                                                                                                                                                                                                                                                                      | The fume hood will remain on at all times when nuclear substances are present.                                                                                                                                                              |     |    |                                                            |
| E18                                                                                                                                                                                                                                                                                                                                      | Provisions will be in place to ensure the fume hood remains functional if a routine automatic after-hours shutdown system is in place.                                                                                                      |     |    |                                                            |
| E19                                                                                                                                                                                                                                                                                                                                      | Fume hood exhaust fans will be connected to an emergency power system to maintain functionality if a power failure occurs.                                                                                                                  |     |    |                                                            |

| <b>E</b> | <b>Ventilation</b>                                                                                                                                                                                                                                                                                                                                                                                    | <b>Yes</b> | <b>No</b> | <b>Justification for variance included as separate attachment</b> |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|-------------------------------------------------------------------|
| E20      | Fume hoods will not contain filters. (If filtration will be required because nuclear substances will be released regularly through the fume hood exhaust or because biohazards are present, then detailed information about the filtration including filter monitoring and exchanges will be supplied.)                                                                                               |            |           |                                                                   |
| E21      | The fume hood exhaust will not connect to other exhaust systems. (If so, detailed information will be provided on the provisions made to ensure that the exhaust from one area cannot flow into another area.)                                                                                                                                                                                        |            |           |                                                                   |
| E22      | Fume hood exhaust ducts will be constructed of corrosion-resistant material appropriate to the substances to be used in the fume hood. All joints will be smoothly finished and sealed.                                                                                                                                                                                                               |            |           |                                                                   |
| E23      | Fume hood exhaust ducts will be clearly identified on plans supplied to maintenance personnel.                                                                                                                                                                                                                                                                                                        |            |           |                                                                   |
| E24      | Fume hood exhaust ducts will be marked at 3 meter intervals with the radiation warning symbol.                                                                                                                                                                                                                                                                                                        |            |           |                                                                   |
| E25      | Fume hood exhaust ducts will contain only vertical sections. (If horizontal sections are to be used, detailed information will be submitted to show how collection of condensates or liquids coming in from the discharge point will be limited; horizontal ducts will slope at least 2.5 cm per 3 meters (1 inch per 10 feet) downward in the direction of the airflow to a suitable drain or sump.) |            |           |                                                                   |
| E26      | Fume hood exhaust fans will be placed close to the discharge point.                                                                                                                                                                                                                                                                                                                                   |            |           |                                                                   |
| E27      | Fume hood exhaust fans will be located outside the building.                                                                                                                                                                                                                                                                                                                                          |            |           |                                                                   |
| E28      | Fume hood exhausts will be located on the roof as far away as possible from any air intakes, to prevent recirculation of the fume hood emissions (the minimum recommended distance is 15.24m from an intake).                                                                                                                                                                                         |            |           |                                                                   |
| E29      | If the air intake will be less than 15.24m from the stack, rain caps on the stack will be avoided.                                                                                                                                                                                                                                                                                                    |            |           |                                                                   |
| E30      | The stack velocity will be at least 1.4 times the average wind velocity.                                                                                                                                                                                                                                                                                                                              |            |           |                                                                   |
| E31      | The stack height will be at least 3.05m above the highest point on any adjacent roofline or air intake. Discharge will be directed vertically upward.                                                                                                                                                                                                                                                 |            |           |                                                                   |
| E32      | Stacks will be placed downwind of the air intakes (based on the average wind direction).                                                                                                                                                                                                                                                                                                              |            |           |                                                                   |

| <b>F</b> | <b>Shielding/Dose Control</b>                                                                                                                                                                    | <b>Yes</b> | <b>No</b> | <b>Justification for variance included as separate attachment</b> |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|-------------------------------------------------------------------|
| F1       | Dose estimates to NEWs and non-NEWs in the area will be attached as part of this application (see Section 3.2 of this guide for details).                                                        |            |           |                                                                   |
| F2       | When appropriate, localized shielding will be used in areas where nuclear substances are to be used or stored depending on the quantities of nuclear substances that emit penetrating radiation. |            |           |                                                                   |
| F3       | When appropriate, shielding will be incorporated into the structure of the room.                                                                                                                 |            |           |                                                                   |
| F4       | A separate waiting room will be available for patients administered nuclear substances.                                                                                                          |            |           |                                                                   |

| <b>G</b> | <b>Miscellaneous</b>                                                                                                                                                                                                                  | <b>Yes</b> | <b>No</b> | <b>Justification for variance included as separate attachment</b> |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|-------------------------------------------------------------------|
| G1       | Food and drink preparation, use, and storage areas will not be present in the room unless required as part of a nuclear medicine procedure. Only patients undergoing studies may consume food or drink in the nuclear medicine rooms. |            |           |                                                                   |
| G2       | Office and study space will not be located near radioactive work areas.                                                                                                                                                               |            |           |                                                                   |
| G3       | Movement of nuclear substances will be minimized by locating in proximity those areas between which nuclear substances must be moved.                                                                                                 |            |           |                                                                   |
| G4       | If the room or storage area is to be used for non-nuclear work as well, then separate labelled areas will be defined for the nuclear and non-nuclear work.                                                                            |            |           |                                                                   |
| G5       | Rooms will have sufficient counter and floor space to allow people to work safely. (In general, allow at least 3 square meters of free floor space for each worker.)                                                                  |            |           |                                                                   |
| G6       | An accessible area will be designated to store materials and equipment used for decontamination and monitoring (spill kits, survey meters where required, contamination meters where required).                                       |            |           |                                                                   |
| G7       | Nuclear medicine departments will have washrooms dedicated for use by nuclear medicine patients.                                                                                                                                      |            |           |                                                                   |
| G8       | Adequate space will be available for radioactive wastes generated by work within the nuclear substance laboratories or nuclear medicine rooms. This space may be within the lab/room or in a separate area.                           |            |           |                                                                   |