

Нетехническое резюме проекта 2102 (для уведомления о планируемой деятельности в соответствии с Конвенцией ESPOO)

Информация о планируемой деятельности

1. Информация о характере планируемой деятельности

В соответствии с принятой Сеймом Литовской Республики (ЛР) Национальной энергетической стратегией [«Об утверждении национальной энергетической стратегии», (Вед. 2002, № 99-4397)] 31 декабря 2009 года Государственное предприятие Игналинская атомная электростанция (ИАЭС) полностью прекратило производство электроэнергии, выполняя обязательства ЛР, предусмотренные договором о вступлении в Европейский Союз. С 1 января 2010 года основной деятельностью ИАЭС является снятие с эксплуатации. Правовой основой снятия ИАЭС с эксплуатации является Закон о снятии ИАЭС с эксплуатации [Ignalinos atominės elektrinės eksploatavimo nutraukimo įstatymas, Nr.XII-914, (Teisėsakty registras, 2014-06-16 Nr. 2014-07639 1)].

Основным нормативным документом, которым руководствуется Игналинская АЭС при планировании и осуществлении снятия с эксплуатации, являются Требования ядерной безопасности BSR-1.5.1-2019 «Снятие объектов ядерной энергетики с эксплуатации», разработанные Государственной инспекцией по безопасности атомной энергетики (VATESI) ЛР.

Вся деятельность Игналинской АЭС по снятию с эксплуатации объединена в один большой проект – Мегапроект снятия с эксплуатации ИАЭС. Мегапроект включает в себя комплекс отдельных проектов по следующим видам деятельности:

- обращению с отработанным топливом;
- обращению с отходами;
- демонтажу и дезактивации оборудования (ДиД);
- модификации существующих и строительство новых объектов инфраструктуры;
- сносу зданий и сооружений.

Финансирование работ по снятию с эксплуатации ИАЭС осуществляется из бюджета Литовской Республики (ЛР) и средств Европейского Союза (ЕС).

Планируемая хозяйственная деятельность относится к проектам по ДиД и определена в Мегапроекте снятия с эксплуатации ИАЭС как «Демонтаж и дезактивация оборудования рабочих зон R1 и R2 2-го энергоблока ИАЭС (Проект 2102)» и является первым этапом в процессе демонтажа реактора 2-го энергоблока. В соответствии с Окончательным планом снятия с эксплуатации, процесс демонтажа реакторов 1-го и 2-го энергоблоков разбит на несколько этапов, каждый из которых будет выполняться по отдельному проекту.

Действие проекта 2102 распространяется на оборудование, расположенное в помещениях рабочих зонах R1 и R2 реактора 2-го энергоблока. Помещения рабочих зон R1 и R2 расположены в границах строительного объема блока А-2 здания 101/2. Более подробная информация о границах проекта 2102 представлена в разделе 2 «Информация о пространственных и временных границах планируемой деятельности».

Согласно Закону Литовской Республики об оценке воздействия на окружающую среду (ОВОС) [Закон ЛР об оценке воздействия планируемой хозяйственной деятельности на окружающую среду (Вед. 1996, № 82-1965, новая редакция TAR 2017-07-05, No. 2017-11562)], планируемая хозяйственная деятельность – Демонтаж и дезактивация

оборудования рабочих зон R1 и R2 2-го энергоблока ИАЭС (Проект 2102), относится к видам деятельности, для которых процедура ОВОС обязательна.

Порядок подготовки, рассмотрения и согласования отчета ОВОС планируемой хозяйственной деятельности представлен на Рисунке 1.

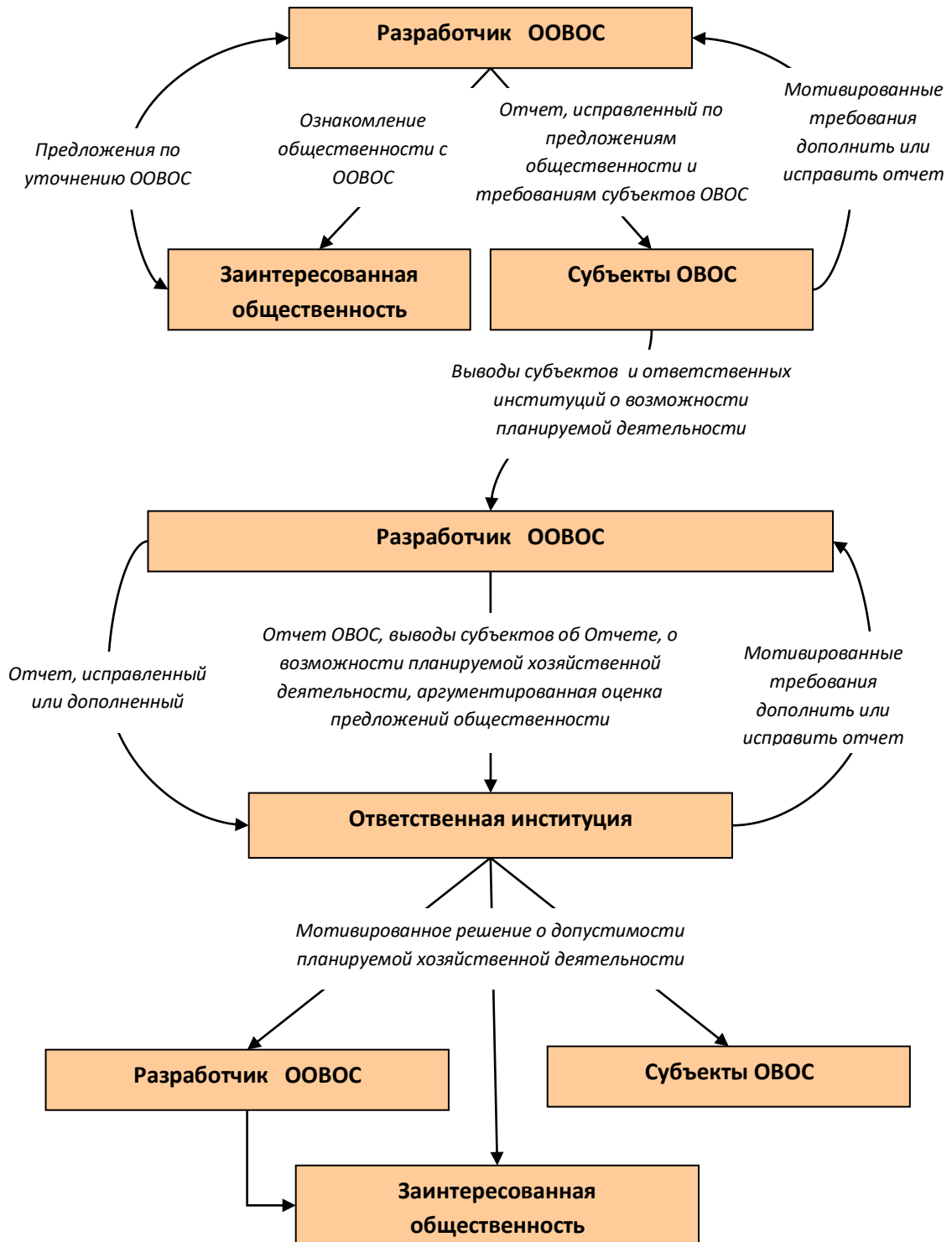


Рисунок 1. Порядок подготовки, рассмотрения и согласования отчета ООВОС

Субъектами ОВОС для разработанного Отчета по оценке влияния на окружающую среду планируемой хозяйственной деятельности, являются:

- VATESI;
- Департамент пожарной защиты и спасения;
- Центр радиационной безопасности;
- Утенский центр здоровья общественности;
- Департамент культурного наследия;
- Самоуправление г. Висагинаса.

Основным этапами и технологическими операциями планируемой хозяйственной деятельности являются:

- подготовительные работы, включая создание буферных зон хранения, участков начальной обработки отходов (измельчения, дезактивации, упаковки) и организация путей транспортировки отходов и оборудования;
- демонтаж оборудования;
- транспортировка отходов демонтированного оборудования, в соответствии с требованиями к их начальной обработке, на участки измельчения, дезактивации, формирования упаковок;
- начальная обработка отходов демонтажа;
- выполнение радиационных измерений отходов и упаковок отходов;
- передача отходов и/или их упаковок на временное хранение, захоронение в зависимости от соответствия критериям приемлемости отходов хранилищам разных классов и требованиям норм ЛР;
- **заключительные работы, включая демонтаж оборудования, установленного при подготовительных работах, восстановление систем инфраструктуры здания, дезактивация помещений и другие работы приведения здания в соответствие требованиям конечного состояния объекта демонтажа определённых проектом.**

Основными целями планируемой деятельности по проекту 2102 являются:

- выполнение ДиД оборудования рабочих зон R1 и R2 реактора 2-го энергоблока ИАЭС;
- упорядочение всех видов отходов, образующихся во время выполнения планируемой хозяйственной деятельности, безопасными для персонала и окружающей среды способами;
- обеспечение сохранности и нормального функционирования систем, остающихся в эксплуатации;
- обеспечение радиационного состояния оборудования, компонентов и строительных конструкций, которые не будут демонтированы, на уровне не выше, чем до начала работ по ДиД.

В результате выполнения работ по проекту 2102, рабочие зоны R1 и R2 реактора 2-го энергоблока будут освобождены от более ненужного оборудования. Таким образом будут подготовлены условия для выполнения следующей стадии демонтажа реактора «ДиД оборудования рабочей зоны R3 (Проект 2103)». Одновременно с работами по демонтажу оборудования из рабочих зоны R1, R2 реактора 2-го энергоблока, расположенных в границах строительного объема блока А2, будут вестись и другие работы по ДиД оборудования блока А-2. Так, большая часть оборудования блока А2 будет демонтирована по проекту «Демонтаж и дезактивация оборудования блоков А-2 и В-2 (проект 2210)».

Демонтаж оборудования рабочих зон R1 и R2 реактора 2-го энергоблока ИАЭС в объеме проекта 2102 будет осуществляться методами разборки, механической и термической резки. Термическая резка включает в себя кислородно-ацетиленовую и плазменную резки.

Выбор технологий выполнения работ по ДиД направлен на снижение коллективной и индивидуальных доз персонала в соответствии с принципом оптимизации (ALARA), уменьшение объема вторичных отходов и выбросов вредных веществ в окружающую среду, уменьшение объема радиоактивных отходов и перевод радиоактивных отходов в более низкий класс. При выборе технологий ДиД будет отдаваться предпочтение дистанционным способам, если их целесообразность и безопасность будет обоснована.

При выполнении планируемой деятельности будет демонтировано около 2121,8т оборудования. Общий состав отходов демонтажа представлен на Рисунке 2. Основные материалы – углеродистая, нержавеющая сталь и бетон (железо-барий серпентинитовый бетон с чугуном порошком). Наличие цветных металлов и графита обусловлено конструкцией каналов реактора, в состав которых входят средние циркониевые части и графитовые комплекты (штулки и кольца).

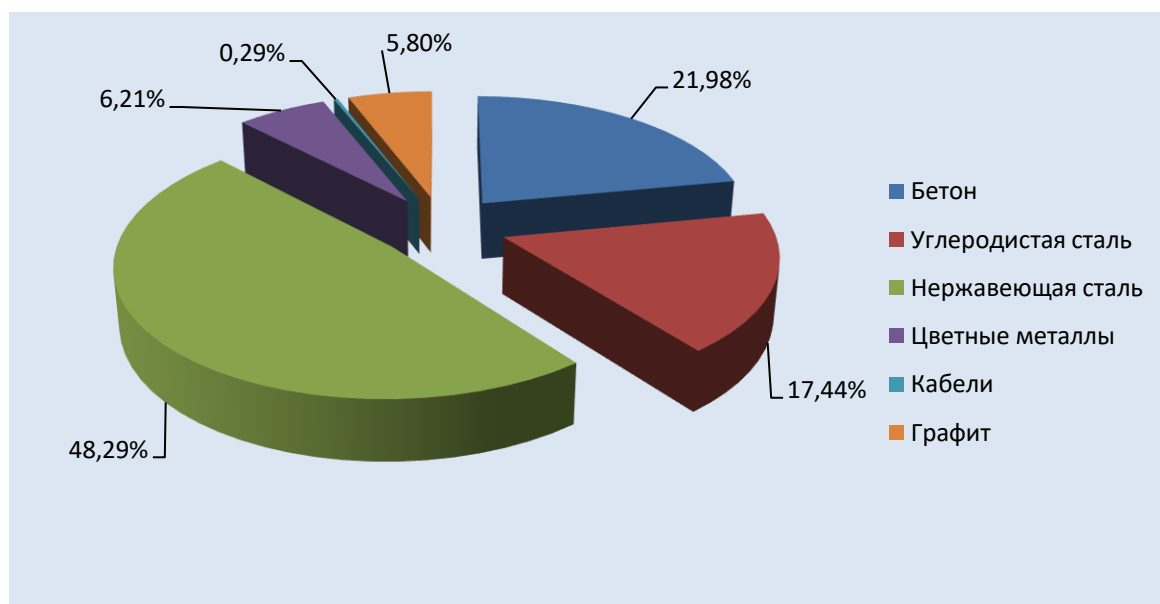


Рисунок 2. Общий состав отходов демонтажа

В процессе выполнения работ по ДиД оборудования рабочих зон R1 и R2 будут образованы радиоактивные отходы классов А, В, С, D, Е.

Классификация радиоактивных отходов установлена требованиями ядерной безопасности BSR-3.1.2-2017 «Обращение с радиоактивными отходами на объектах ядерной энергетики до их захоронения в могильнике радиоактивных отходов», (ТАР, 2017-07-31, №12866). В соответствии с этим документом к классам А, В и С относятся короткоживущие радиоактивные отходы очень низкой, низкой и средней активности, а к классам D и E долгоживущие радиоактивные отходы низкой и средней активности. Распределение первичных радиоактивных отходов по классам, согласно BSR-3.1.2-2017, до их начальной обработки представлено на Рисунке 3.

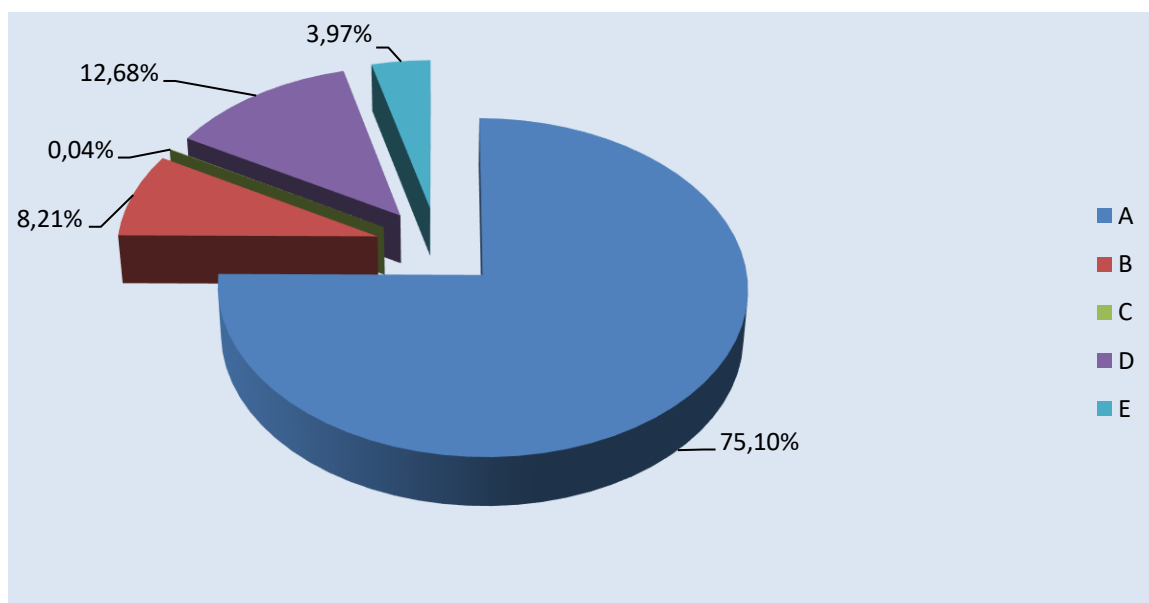


Рисунок 3. Распределение первичных радиоактивных отходов по классам

Часть радиоактивных отходов классов А и В будет подлежать дезактивации, для соответствия критериям приемлемости, установленным для захоронения в могильнике Landfill (проект В19). Дезактивация отходов классов С, D, Е производиться не будет.

По окончании планируемой деятельности все демонтированное оборудование (первичные отходы), а также вторичные отходы, образовавшиеся при выполнении работ, будут удалены из здания 101/2 на дальнейшую обработку, хранение и захоронение в соответствующие комплексы по обращению с отходами. Дальнейшее обращение с отходами будет выполняться в соответствии с положениями действующих на ИАЭС документов, в соответствии с их классами:

- отходы класса А – захоронению в могильнике короткоживущих отходов очень низкой активности Landfill (проект В19);
- отходы класса В и С – переработка и промежуточное хранение в КОХТО (проект В3/4), с последующим захоронением в приповерхностном могильнике (проект В25);
- отходы графита класса D – промежуточное хранение в здании 158/2 (обоснование безопасности работ выполнено по проекту В38);
- металлические отходы класса D, Е – переработка и промежуточное хранение в КОХТО (проект В3/4).

В перспективе, согласно действующей на ИАЭС стратегии по обращению с РАО, отходы классов D и Е будут направляться в глубинный геологический могильник.

Информация о существующих и строящихся комплексах в рамках проектов В19,В3/4,В25 подробно представлена в презентации «**INPP decommissioning key projects**», расположенной на сайте Министерства окружающей среды Литовской Республики.

2. Информация о пространственных и временных границах планируемой деятельности

Игналинская атомная электростанция находится в северо-восточной части Литвы на берегу озера Друкшяй, примерно в 140 км от столицы Литвы г. Вильнюса, вблизи государственных границ с Латвией и Беларусью на удалении примерно 8 и 4 км соответственно и примерно в 260 км от границы с Польшей (Рисунок 4). До границ других государств расстояние еще больше.

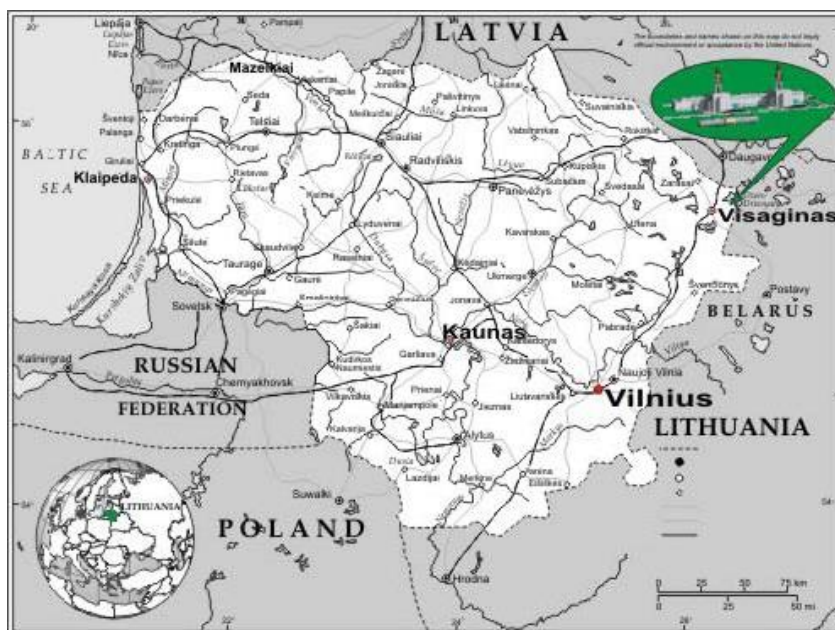


Рисунок 4. Расположение Игналинской АЭС

ИАЭС состоит из двух энергоблоков с реакторами типа РБМК-1500 (электрическая мощность – 1500 МВт). Первый энергоблок находился в эксплуатации с 1983 года до 31 декабря 2004 года, второй энергоблок с 1987 года до 31 декабря 2009 года.

Территория ИАЭС и ее помещения подразделяются на контролируемую зону и наблюдаемую зону. Радиационное воздействие на персонал возможно только в контролируемой зоне, доступ в которую производится через санпропускники и ограничивается административными средствами или физическими барьерами. В наблюдаемой зоне факторы радиационной опасности не превышают уровней, установленных для лиц категории «Население», то есть практически отсутствуют.

Вокруг площадки ИАЭС установлена санитарно-защитная зона (СЗЗ) радиусом 3 км. В пределах СЗЗ нет постоянных жителей и ограничена хозяйственная деятельность. Ближайший населенный пункт находится на расстоянии приблизительно 3,5 км к юго-западу от площадки. Границы СЗЗ ИАЭС и объекты, расположенные вблизи нее, показаны на Рисунке 5. Планируемая хозяйственная деятельность не потребует пересмотра или уточнения границ СЗЗ, установленной ИАЭС.

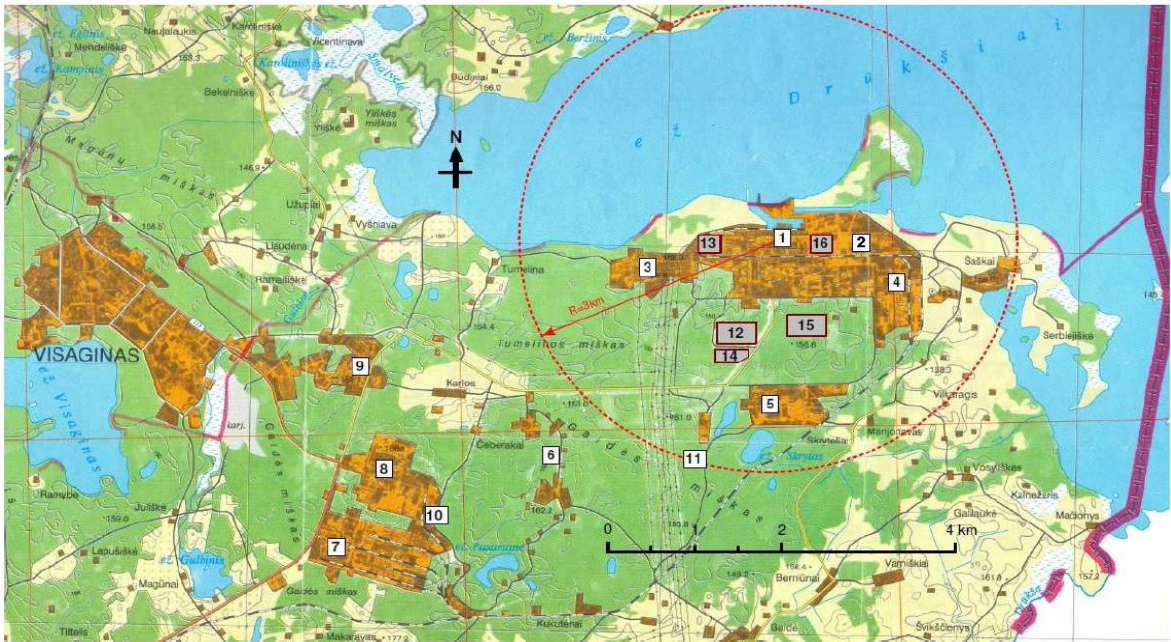


Рисунок 5. СЗЗ Игналинской АЭС и объекты, расположенные вблизи нее:

1 – энергоблоки ИАЭС, 2 – существующее хранилище отработанного ядерного топлива - ХОЯТ, 3 – открытое распределительное устройство (ОРУ), 4 – база оборудования, 5 – очистные сооружения г. Висагинас, автотранспортное хозяйство, 6 – водозаборные сооружения г. Висагинас, 7 – строительная база, 8 – база строительной индустрии, 9 – территория бывшей военной части, 10 – отопительная котельная г. Висагинас, 11 – свалка бытовых отходов г. Висагинас, 12 – новое промежуточное хранилище отработанного ядерного топлива- ПХОЯТ (В1), строящийся КОХТО (В3/4), 13 – площадка нового комплекса извлечения отходов - КИТО (В2), 14 – площадка нового могильника очень низкоактивных отходов (ОНАО) типа «Landfill», 15 – площадка нового поверхностного могильника короткоживущих радиоактивных отходов низкой и средней активности (В25), 16 - площадка буферного хранилища ОНАО типа «Landfill» и площадка измерения материалов далее не контролируемых уровней. Так же указана существующая 3-км СЗЗ.

Оборудование реактора, подлежащее демонтажу по данному проекту, расположено в границах строительного объема блока А2. Блок А2 вместе с блоками В2, В2, Д2 и Г2 входит в состав здания 101/2 – главного корпуса 2-го энергоблока ИАЭС. Расположение здания 101/2 на площадке ИАЭС показано на Рисунке 6.

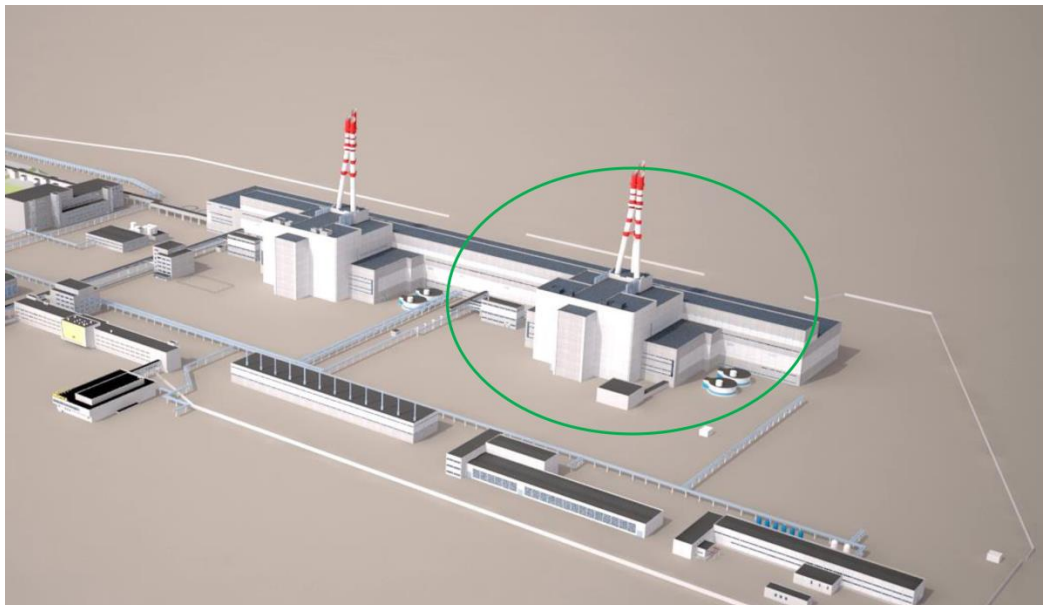


Рисунок 6. Расположение здания 101/2 на площадке ИАЭС

Взаимная компоновка блоков в составе здания 101/2 показана на Рисунке 7.

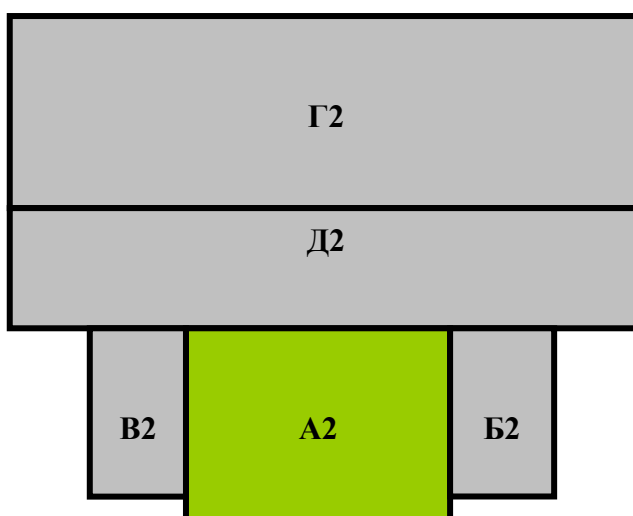


Рисунок 7. Взаимная компоновка блоков в составе здания 101/2

С учетом конструктивных особенностей реактора, выбраны три зоны с радиоактивно загрязненными конструкциями, элементами и материалами – зоны R1, R2 и R3. Общий вид рабочих зон R1, R2 и R3 представлен на Рисунке 8.

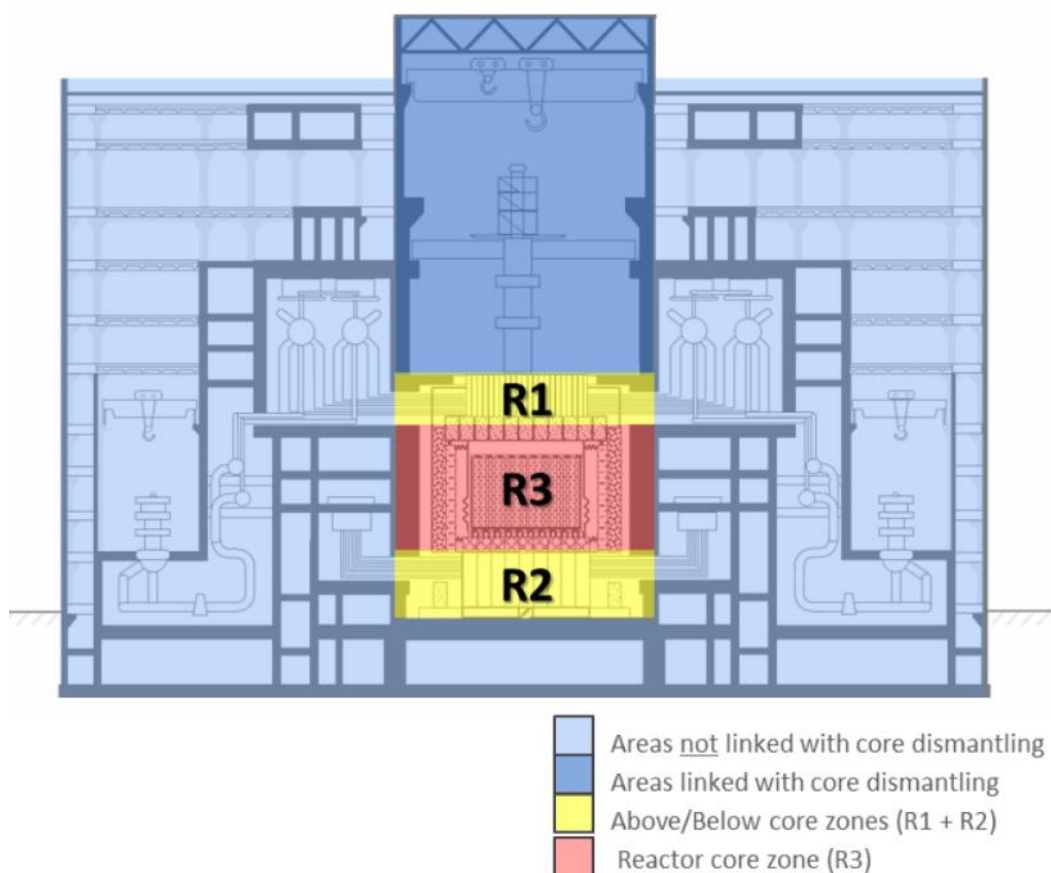


Рисунок 8. Общий вид рабочих зон R1, R2 и R3

Зона R1 – зона в шахте реактора, пом. 210 и, частично, пом. 506/1,2 блока А2, расположенная выше высотной отметки + 20.70.

Зона R2 – зона в шахте реактора, пом. 125 блока А2 и, частично, пом. 209/1,2 блока А2,

расположенная от высотной отметки + 0,9 м до + 5,95 м.

Зона R3 – зона в шахте реактора между высотными отметками + 5,95 м и + 20,70 в пом. 210 блока А2.

В рамках проекта 2102 будет демонтировано оборудование из рабочих зон R1, R2 и, тем самым, подготовлены условия для демонтажа оборудования реактора из рабочей зоны R3. Основное оборудование, расположенное в рабочих зонах R1, R2 это каналы реактора, тракты каналов, пароводяные и нижние водяные коммуникации, кабели и другое более мелкое оборудование, расположенное в помещениях 125, 209/1, 2, 210, 506/1,2 блока А2.

Места проведения работ оборудованы существующими системами спецвентиляции или мобильными фильтровальными установками, оснащенных высокоэффективными аэрозольными фильтрами, с эффективностью очистки не ниже 99,9%. Это позволяет практически полностью исключить попадание загрязненных нуклидами аэрозолей в воздух окружающей среды.

По предварительной оценке предполагается, что планируемая хозяйственная деятельность продлится примерно 6 лет – в период с 2023 по 2028 год.

3. Информация о предполагаемом воздействии на окружающую среду и предлагаемых мерах по смягчению его последствий

Водные компоненты

Не ожидается воздействия планируемой хозяйственной деятельности на поверхностную и подземную воду региона ИАЭС и соседних стран ввиду того, что:

- планируемая хозяйственная деятельность будет выполняться на территории контролируемой зоны промышленной площадки ИАЭС;
- не планируется увеличение потребления подземной и поверхностной воды, следовательно не будет влияния на гидрологию региона;
- при нормальных условиях эксплуатации во время планируемой хозяйственной деятельности попадание неконтролируемых стоков в окружающую среду исключено;
- производственные стоки с целью полного исключения возможности попадания в окружающую среду радионуклидов, будут переработаны как потенциально радиоактивные стоки. Для этого стоки будут перекачаны в комплекс по обработке жидких радиоактивных отходов ИАЭС. Таким образом, будет исключена возможность загрязнения окружающей среды;
- коммунальные стоки будут собираться системой сбора стоков и перекачиваться для обработки на комплекс очистных сооружений ГП «Visagino energija». Так как работы будут выполнять существующий персонал ИАЭС, не ожидается увеличения количества стоков ИАЭС по сравнению с существующим;
- поверхностные стоки с территории ИАЭС в окружающую среду (озеро Друкшяй) выпускаются через каналы производственно-поверхностной канализации, оборудованные механическими нефтесодерживающими устройствами;
- планируемая деятельность будет выполняться за пределами СЗЗ водозаборных сооружений и скважин города Висагинас, которые находятся примерно в 3 км к юго-западу от площадки ИАЭС. Источники питьевой воды района Даугавпилс Латвии и Браславского района Беларуси находятся на значительно большем удалении (Рисунок 9);

- ИАЭС обеспечивает постоянный мониторинг грунтовой воды, мониторинг поверхностных и производственных стоков в озеро Друкшяй, мониторинг озера Друкшяй.

Меры по уменьшению влияния от планируемой хозяйственной деятельности не предусматриваются в связи с отсутствием этого влияния.

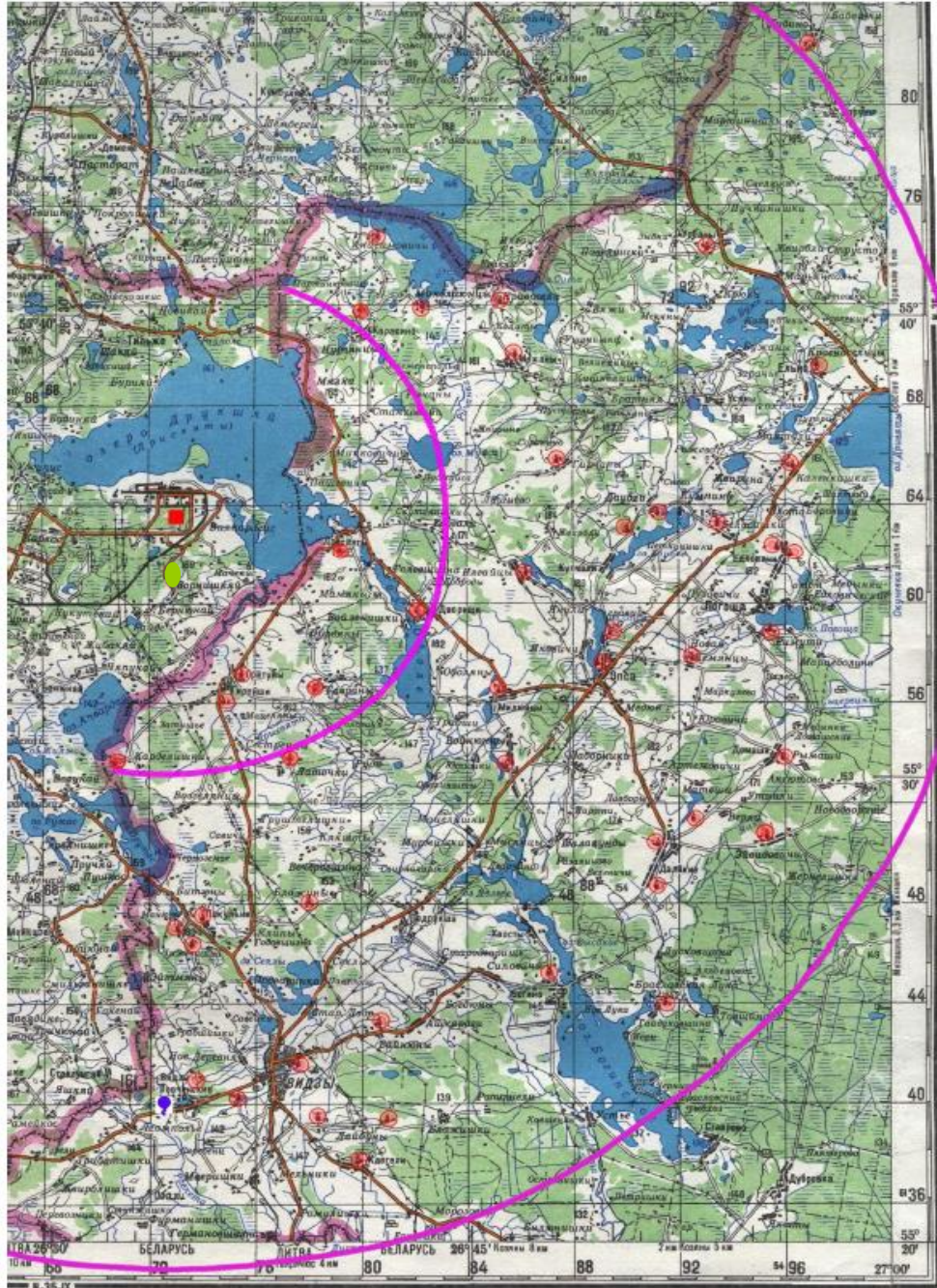


Рисунок 9. Населенные пункты и источники питьевой воды на территории Беларуси на расстоянии 10 км и 30 км от ИАЭС.

Воздух окружающей среды

Нерадиологическое воздействие

Во время планируемой хозяйственной деятельности загрязнители воздуха будут образовываться во время резки демонтируемого оборудования и при транспортировке материалов демонтажа и дезактивации. Выбросы от резки оборудования (в виде

аэрозолей) практически полностью будут уловлены существующими высокоэффективными системами очистки выбросов. Исключение составляют только газообразные выбросы CO и NO_x, которые не удерживаются системой очистки. Однако, их количество будет незначительным. Концентрация загрязнителей в воздухе окружающей среды в результате выполнения планируемой деятельности не только не превысят пороговых значений загрязнения воздуха, установленных требованиями нормативных документов, но и будут значительно ниже установленных предельных значений.

Транспортные средства, перевозящие материалы демонтажа и дезактивации, не окажут существенного влияния на качество воздуха окружающей среды. Движение транспорта будет выполняться только в пределах промышленной площадки ИАЭС.

Таким образом, планируемая хозяйственная деятельность по Д и Д оборудования по проекту 2102 не окажет отрицательного влияния на окружающую среду района Браслав Беларуси и региона Даугавпилс Латвии.

Не планируются какие-либо специальные меры по смягчению воздействия на воздух окружающей среды в дополнение к мерам, которые будут запланированы в технологическом проекте ДиД.

Радиологическое воздействие

Возможное радиологическое воздействие планируемой хозяйственной деятельности на компоненты окружающей среды за пределами СЗЗ оценено как очень низкое. Согласно выполненной оценке, максимальная годовая эффективная доза для репрезентанта (члена критической группы населения) для нормальных условий составит $7,47E-06$ мЗв, что составит $7,47E-03\%$ от ограниченной дозы облучения для выбросов – $0,1$ мЗв. К репрезентантам для ИАЭС относятся жители, проживание или деятельность которых проходит на границе СЗЗ и зоны наблюдения станции.

Анализ инцидентов, которые могут возникать при выполнении планируемой деятельности по проекту 2102, показал, что их возможное негативное воздействие будет оказано только на персонал непосредственно выполняющий работы на рабочих местах в помещениях главного корпуса второго энергоблока – зд.101/2. Так как все рабочие места в помещениях блока А-2 оснащены высокоэффективными системами очистки выбросов, то при всех инцидентах повышения воздействия на окружающую среду не будет. Максимальное воздействие на персонал в случае инцидентов при выполнении радиационно-опасных работ составит: *вследствие попадания радиоактивных веществ на кожный покров – максимальная доза облучения кожных покровов равна $1,46$ мЗв, что составляет $0,3\%$ от допустимого годового значения (500 мЗв).* Работы, связанные с транспортировкой упаковок с РАО, образующихся от планируемой хозяйственной деятельности, по внутренним дорогам площадки ИАЭС от зд.101/2 до комплексов по обращению с РАО в объеме проекта 2102 не входят. Анализ инцидентов с повреждением упаковок с РАО при транспортировке по внутренним дорогам площадки ИАЭС для соответствующих РАО выполнен в ранее разработанных и утвержденных в установленном порядке документах: ООВОС и ОАБ для объектов по переработке и хранению РАО - В3/4, В19, В25 и в зд.158 (по проекту В-38). Применительно к нашему проекту, можно отметить, что при наиболее тяжелом инциденте, связанном с падением и повреждением транспортного контейнера G-2, заполненного отходами класса В и С, возможное воздействие на репрезентантов (членов критической группы) на границах с Латвией и Республикой Беларусь составит:

- эффективная доза облучения на границе с Латвией - $7,67E-04$ мЗв;
- эффективная доза облучения на границе с Республикой Беларусь - $1,03E-03$ мЗв.

С целью защиты персонала, жителей Литовской Республики и соседних государств от

последствий возможных радиологических аварий за границами СЗЗ, ИАЭС постоянно выполняет планирование и разработку противоаварийных мероприятий. В случае превышения норм рассеивания радиоактивных материалов за пределами СЗЗ, предусмотренных для нормальных условий эксплуатации ОЯБ, вступает в силу План аварийной готовности ИАЭС и осуществляется разведка радиационной обстановки в пределах СЗЗ и за ее пределами. В соответствии со сложившейся ситуацией, должны выполняться мероприятия по защите жителей за пределами СЗЗ, а также мероприятия по ограничению дозы облучения персонала.

Учитывая, что радиологическое воздействие планируемой хозяйственной деятельности на окружающую среду значительно ниже оцененного в Плане аварийной готовности ИАЭС радиологического воздействия при запроектных авариях, можно утверждать, что планируемая хозяйственная деятельность не окажет влияния и на компоненты окружающей среды района Браслав Беларуси и региона Даугавпилс Латвия, которые значительно удалены от источника возможных выбросов.

Планируемые проектные решения предусматривают концепцию разных барьеров для локализации, сдерживания и сбора переносимой по воздуху радиоактивности с целью предотвращения любых существенных радиоактивных выбросов в производственную среду и/или атмосферу.

Во время выполнения планируемой деятельности будет выполняться мониторинг фактических радиоактивных выбросов в рабочие помещения и в воздух окружающей среды.

Почва

Планируемая хозяйственная деятельность по проекту 2102 будет выполняться в пределах промышленной площадки ИАЭС, поэтому воздействие на почву и геологическую структуру земли района Браслав в Беларуси и региона Даугавпилс в Латвии исключено. В связи с отсутствием какого-либо воздействия планируемой хозяйственной деятельности никакие дополнительные меры по уменьшению этого воздействия не предусматриваются.

Отдел экологической безопасности ИАЭС обеспечивает постоянный мониторинг почвы, грунтовой воды, мониторинг стоков в озеро Друкшяй, мониторинг озера Друкшяй.

Недра земли

Так как во время осуществления планируемой хозяйственной деятельности не предусматривается выполнение никаких строительных работ, новых фундаментов, насыпей и перемещение земель, то дополнительного воздействия на геологическую основу грунта не будет. Никакие опасные материалы или стоки не будут сбрасываться напрямую (без просачивания через почву или подпочву) или косвенно (просачиваясь через почву или подпочву). Подземные полости не будут использоваться для хранения или захоронения каких-либо токсичных материалов.

Планируемая хозяйственная деятельность по проекту 2102 не будет оказывать воздействия на недра земли района Браслав Беларуси и региона Даугавпилс Латвия.

Биологическое разнообразие

Планируемая хозяйственная деятельность по проекту 2102 будет выполняться на территории промышленной площадки ИАЭС, где не встречаются никакие виды флоры и фауны, охраняемые соответствующими правовыми актами ЛР и ЕС. Воздействие планируемой хозяйственной деятельности на биологическое разнообразие за территорией промышленной площадки ИАЭС будет очень незначительными и связанным с выхлопными газами, шумом и световыми сигналами автомобилей. Движение машин ожидается только в дневное время и без изменения существующей интенсивности

движения.

На территориях района Браслав Беларуси и региона Даугавпилс Латвия шума не будет слышно, так как эти регионы удалены от площадки ИАЭС на расстоянии не менее 5 км.

Отдел экологической безопасности ИАЭС обеспечивает постоянный мониторинг содержания радионуклидов в образцах растительности, овощей, пищевых продуктов, отбираемых в регионе ИАЭС.

Ландшафт

Планируемая хозяйственная деятельность будет выполняться в пределах промышленной площадки ИАЭС, не предусматривает работ по строительству и разрушению зданий, а также других работ, способных повлиять на ландшафт площадки ИАЭС и ландшафт за пределами площадки. Воздействия на жилые зоны и зоны отдыха оказано не будет.

Социально-экономическая окружающая среда

Планируемая хозяйственная деятельность будет выполняться в пределах промышленной площадки, вдали от мест постоянного проживания в Латвии и Беларуси. Воздействие на население Латвии и Беларуси или явного изменения социально-экономических условий не прогнозируется.

Работы по проекту 2102 будут выполняться в строгом соответствии с государственными нормативными документами, согласованными с правовой базой ЕС, требованиями международных организаций, таких как МАГАТЭ, установленных рекомендаций и конвенций, кроме того, под надзором регулирующих институций Литовской Республики.

ИАЭС имеет достаточные производственные ресурсы, квалифицированный персонал и опыт в реализации подобных проектов по ДиД, чтобы быть в состоянии успешно выполнить работы по проекту 2102.

Работы по проекту 2102 будут проводиться в соответствии с современными экологическими требованиями, используя самые современные технологии, принципы обращения с радиоактивными отходами МАГАТЭ и существующей хорошей практики стран Европейского союза.

Культурное наследие

Планируемая хозяйственная деятельность будет выполняться в пределах промышленной площадки ИАЭС и не повлияет на объекты и зоны культурного наследия Латвии и Беларуси.

Здоровье общественности

Нерадиологическое воздействие

Планируемая хозяйственная деятельность будет выполняться на промышленной площадке ИАЭС. Вокруг ИАЭС установлена СЗЗ радиусом в 3 км. В этой зоне нет постоянных жителей. Ближайшие места проживания людей находятся на значительном удалении от ИАЭС, поэтому влияние от работ по Д и Д или от транспортировки грузов по территории площадки будет незначительным.

Потенциальное влияние планируемой хозяйственной деятельности будет минимизировано за счет использования высокоэффективных фильтров, кроме того, будут обеспечены хорошие условия дисперсии загрязнителей. Учитывая, что ближайшие места проживания людей отдалены от места выполнения планируемой хозяйственной деятельности, не ожидается влияния на здоровье населения в регионе ИАЭС.

Других значимых факторов, влияющих на здоровье населения в регионе ИАЭС во время выполнения планируемой хозяйственной деятельности, не ожидается.

Таким образом, планируемая хозяйственная деятельность не окажет существенного отрицательного влияния на здоровье населения района Браслав Беларуси и региона Даугавпилс Латвии.

Радиологическое воздействие

Согласно выполненной оценки по радиационному облучению населения вследствие потенциального выброса радиоактивного материала от планируемой хозяйственной деятельности в атмосферу максимальная годовая эффективная доза для репрезентанта (члена критической группы населения) составит $7,47E-06$ мЗв, что составит $7,47E-03\%$ от ограниченной годовой дозы облучения для выбросов – $0,1$ мЗв. Потенциальное облучение населения в соседних государствах будет еще ниже из-за более отдаленного их расположения от источника выброса.

Сравнительная оценка негативного воздействия ИАЭС на окружающую среду в период эксплуатации и в период после окончательного останова энергоблоков и перехода в режим вывода с эксплуатации представлена на диаграмме оценки дозы облучения для репрезентанта, обусловленной газо-аэрозольными выбросами и водными сбросами станции (Рисунок 10).

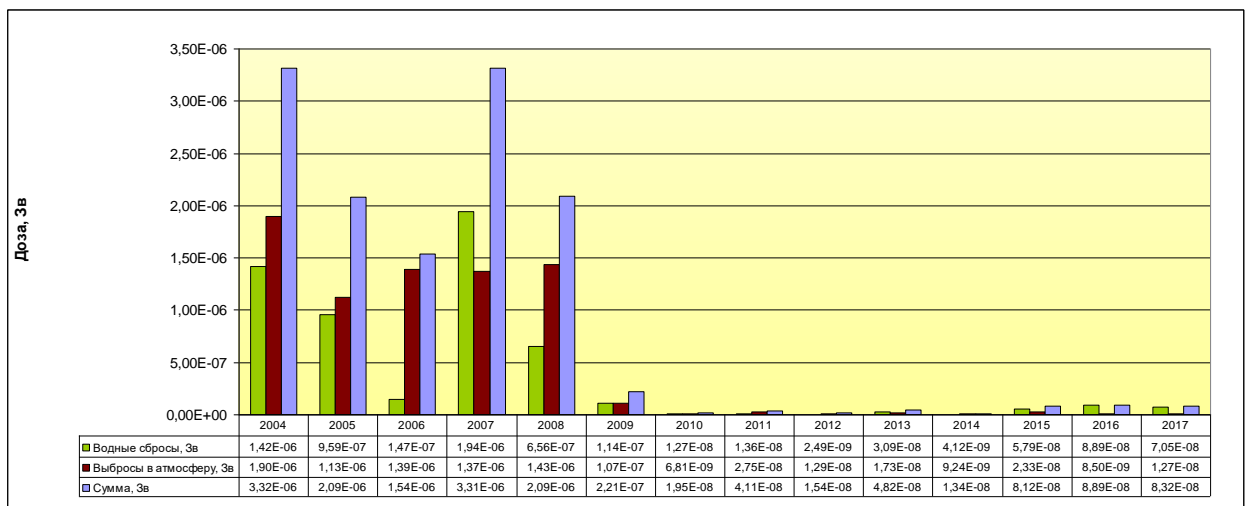


Рисунок 10. Годовая эффективная доза облучения репрезентанта, обусловленная воздушными выбросами и водными сбросами ИАЭС за 2004-2017 г.

Очевидно, что начиная с 2010 года, когда основной деятельностью ИАЭС стал процесс вывода с эксплуатации, дозы облучения репрезентанта значительно снизились. В период с 2010 года выполнялись и продолжают выполняться ряд проектов по ДИД оборудования первого и второго энергоблоков ИАЭС (зд.117/1, зд.117/2; блоки Г-1, Г-2, В-1, Д-1, Д-2, Д-0), что не привело и не приводит к какому-либо заметному увеличению негативного воздействия на окружающую среду.

Анализ ожидаемых изменений радиационных выбросов позволяет сделать заключение, что планируемая хозяйственная деятельность не ухудшает существующую радиологическую ситуацию за пределами площадки ИАЭС.

Так как дополнительного радиологического влияния на население соседних государств в результате выполнения планируемой хозяйственной деятельности оказано не будет, никакие мер по смягчению этого влияния не требуется.

Воздействие планируемой хозяйственной деятельности на окружающую среду в сравнении с воздействием от всех объектов ядерной энергетики (ОЯБ) на площадке ИАЭС

Оценка годовой эффективной дозы репрезентанта от радиоактивного воздействия воздушных выбросов и водных сбросов от существующих ОЯЭ ИАЭС в период 2019-2029 г., в мЗв представлена в Таблице 1.

Общая годовая эффективная доза репрезентанта от всех ОЯБ на площадке ИАЭС не превышает годовой ограниченной дозы облучения для выбросов и сбросов – 0,2 мЗв, установленной нормативными документами для ОЯБ и имеет максимальное оценочное значение для 2020 года примерно 0,00211 мЗв, что в 94,9 раза меньше годовой граничной дозы.

Максимальная оценочная годовая доза для репрезентанта от воздействия планируемой хозяйственной деятельности составит в 2024 году - 7,47E-06 мЗв, что составляет порядка 4,61E-02% общей годовой эффективной дозы репрезентанта от радиоактивного воздействия (выбросов в воздух и сбросов в воду) на окружающую среду от существующих на площадке ИАЭС ОЯЭ – 0,0162 мЗв в 2024 году.

Таким образом, можно утверждать, что воздействие планируемой хозяйственной деятельности на окружающую среду в пределах СЗЗ ИАЭС пренебрежительно мало. Следовательно, дополнительного радиологического влияния на население соседних государств в результате выполнения планируемой хозяйственной деятельности оказано не будет.

Пояснение к Таблице 2:

- U1DP0 - проект снятия с эксплуатации 1-го энергоблока в период выгрузки топлива (включает в себя все виды деятельности, кроме ДиД оборудования и строительства новых объектов);
- U2DP0 - проект снятия с эксплуатации 2-го энергоблока в период выгрузки топлива (включает в себя все виды деятельности, кроме ДиД оборудования и строительства новых объектов);
- Проект 2207 – работы по ДиД оборудования блока Г-1;
- Проект 2208 – работы по ДиД оборудования блока Г-2;
- Проект 2214 – работы по ДиД оборудования блоков Д-1 и Д-2;
- Проект 2203 - работы по ДиД оборудования блока А-1;
- Проект 2101 - работы по ДиД нижних и верхних коммуникаций РУ 1-го энергоблока;
- Проекты по строительству новых объектов В1, В2, В3/4, В19, В25 (информация о существующих и строящихся комплексах в рамках проектов В1, В2, В3/4, В19, В25 подробно представлена в презентации «**INPP decommissioning key projects**», расположенной на сайте Министерства окружающей среды Литовской Республики).

Трансграничная оценка воздействия новых ОЯЭ ИАЭС на окружающую среду с участием Латвийской Республики и Республики Беларусь:

- Проект В1 - Промежуточное хранилище для отработавшего ядерного топлива. В 2007 году Латвийская Республика и Республика Беларусь участвовали в процессе оценки трансграничного воздействия на окружающую среду ПХОЯТ, были представлены комментарии и предложения, общественные слушания прошли в г. Даугавпилс 13 марта 2007 года и в г. Видзы 19 апреля 2007 года соответственно.
- Проект В2/3/4 - Комплекс по обращению и хранению твёрдых радиоактивных отходов. В 2008 году Латвийская Республика и Республика Беларусь участвовали в процессе оценки трансграничного воздействия на окружающую среду КОХТО, общественные слушания отчета ОВОС проводились в г. Даугавпилс 13 марта 2008 года и в г. Видзы 17 мая 2008 года соответственно, были предоставлены комментарии и предложения. С учетом этого трансграничные консультации с экспертами Министерства окружающей среды и Центра радиационной защиты Латвийской Республики также были проведены в Вильнюсе 4 июня 2008 года, а трансграничные консультации с экспертами Республики Беларусь были проведены в Вильнюсе 6 июня 2008 года.
- Проект В19 – Могильник Landfill для короткоживущих очень низкоактивных радиоактивных отходов. В 2008 году Латвийская Республика и Республика Беларусь участвовали в процессе оценки трансграничного воздействия на окружающую среду по проекту В19, программа ОВОС была представлена для анализа, а заинтересованными сторонами были представлены комментарии и предложения. Позже, в 2009 году был предоставлен отчет ОВОС, общественные слушания отчета ОВОС прошли в г. Даугавпилс 22 апреля 2009 года, комментариев не последовало. Никаких комментариев от Республики Беларусь также не поступало.
- Проект В25 - Приповерхностный могильник для низко- и среднеактивных короткоживущих радиоактивных отходов. В 2005 году Латвийская Республика участвовала в процессе оценки трансграничного воздействия на окружающую среду по проекту В-19, общественные слушания отчета ОВОС были проведены в г. Даугавпилс 9 июня 2005 года, общественные слушания по обновленному отчету ОВОС проходили в г. Даугавпилс 12 декабря 2006 года, где были предоставлены комментарии. Заключительные трансграничные консультации с экспертами Министерства окружающей среды и других учреждений Латвийской Республики проводились в г. Вильнюс 16 марта 2007 года, где также были предоставлены комментарии и рассмотрена позиция государства. Поскольку Республика Беларусь присоединилась к конвенции Espoo только в конце 2005 г., информация о планируемой деятельности предоставлялась на основе добрососедства. Заседание по этому вопросу состоялось в мае 2005 г., 21 декабря 2006 г. обновленный Отчет по ОВОС был представлен общественности в Браславе. 5-7 февраля 2007 г. в Висагинасе состоялось заседание рабочих групп, а 19 апреля 2007 г. были проведены заключительные трансграничные консультации с экспертами Республики Беларусь, рассмотрены предоставленные комментарии и позиция государства.

4. Инициатор

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**AMENDED NON-TECHNICAL ENVIRONMENTAL IMPACT ASSESSMENT
SUMMARY FOR DISMANTLING AND DECONTAMINATION OF EQUIPMENT
FROM THE WORKING AREAS R1 AND R2 OF IGNALINA NUCLEAR POWER
PLANT UNIT 2 REACTOR (PROJECT 2102)**

Information on the Proposed Activity

1. Information on the Specificity of the Proposed Activity

In accordance with the National Energy Strategy adopted by the Seimas of the Republic of Lithuania [“On the approval of the National Energy Strategy” (Valstybės žinios (Official Gazette) 2002, No. 99-4397)], the State Enterprise Ignalina Nuclear Power Plant (INPP) completely ceased the production of electricity starting from 31 December 2009 due to the fulfilling of the obligations of the Republic of Lithuania, provided for in the Treaty of Accession to the European Union. The main INPP activity from 1 January 2010 is decommissioning. The legal basis for the INPP decommissioning is the Law on the INPP decommissioning [Law on the Ignalina Nuclear Power Plant Decommissioning, No. XII-914 (Register of legal acts, 16-06-2014 No. 2014-07639 1].

The main normative document governing the activity of the Ignalina NPP in planning and implementation of the decommissioning process is the Nuclear Safety Requirements BSR-1.5.12019 “Decommissioning of Nuclear Facilities” developed by the State Nuclear Power Safety Inspectorate (VATESI) of the Republic of Lithuania.

All the Ignalina NPP decommissioning activity is:

- Spent nuclear fuel management;
- Waste management;
- Dismantling and decontamination (D&D) of equipment;
- Modification of existing facilities of infrastructure and the construction of the new ones;
- Demolition of buildings and structures.

INPP decommissioning activity is financed from the budget of the Republic of Lithuania and the European Union (EU).

The proposed economic activity is assigned to D&D projects and is defined in the INPP Decommissioning Megaproject as “Dismantling and decontamination of equipment from the INPP Unit 2 Reactor working areas R1 and R2 (Project 2102)” is the first stage in the process of dismantling of Unit 2 reactor. In accordance with the Final Decommissioning Plan, the process of dismantling of Units 1 and 2 reactors is subdivided into several stages, each of which will be carried out according to a separate project.

Project 2102 applies to equipment located in the premises of Unit 2 Reactor working areas R1 and R2. The premises of the working areas R1 and R2 are located within the construction boundaries of block A-2, building 101/2. More detailed information on the boundaries of the 2102 project is presented in section 2 “Information on the spatial and temporal boundaries of the proposed activity”.

According to the Law of the Republic of Lithuania on Environmental Impact Assessment (EIA) [Law of the Republic of Lithuania on the Assessment of the Impact on the Environment of the Proposed Economic activity (Official Gazette 1996, No. 82-1965, new redaction TAR 2017-0705, No. 2017-11562)], the proposed economic activity – dismantling and decontamination of

equipment from the INPP Unit 2 reactor working areas R1 and R2 (Project 2102), refers to the kinds of the activity for which the EIA procedure is obligatory.

The procedure for the preparation, review and approval of the EIA Report for the proposed economic activity is presented in Figure 1.

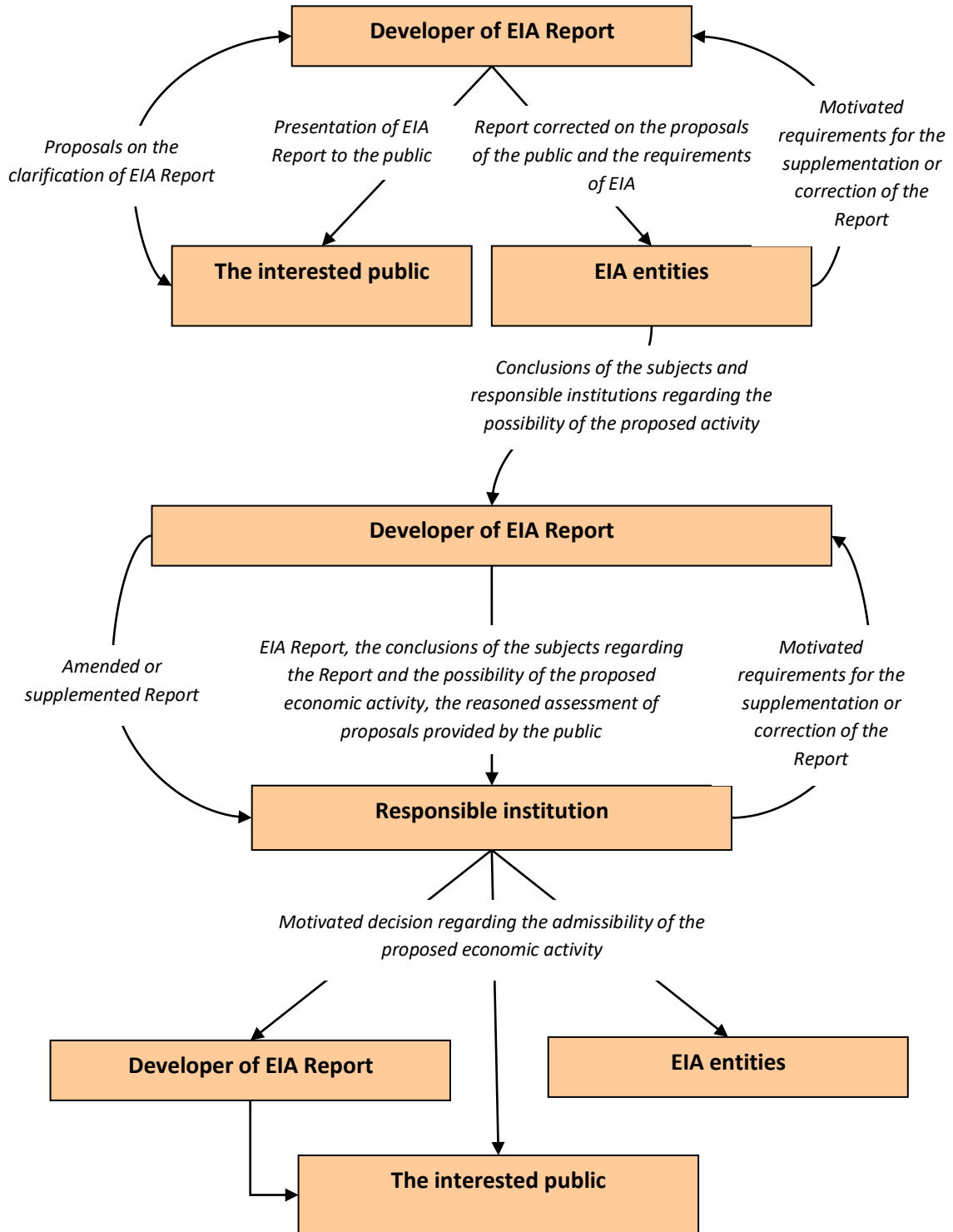


Figure 1. Procedure for the preparation, review and approval of the EIA Report

The EIA process entities reviewing the prepared Environmental Impact Assessment Report of the proposed economic activity are as follows:

- VATESI;
- Fire and Rescue Department;
- Radiation Protection Centre;
- Utena Health Care Centre;
- Department of Cultural Heritage;
- Municipality of Visaginas.

The main stages and technological operations of the proposed economic activity are the following:

- preparatory works, including the establishment of buffer zones, areas of initial treatment of waste (decontamination, packaging) and organization of transportation ways of waste and equipment;
- dismantling of equipment;
- transportation of waste of the dismantled equipment in accordance with the requirements to their initial treatment to the areas of fragmentation, decontamination and packaging;
- initial treatment of dismantling waste;
- radiation measurements of waste and waste packages;
- transfer of waste and/or waste packages to the interim storage, disposal depending on the different classes waste acceptance criteria for each storage facility and the requirements of the normative documents of the Republic of Lithuania;
- final works, including dismantling of equipment installed during preparatory works, restoration of building infrastructure systems, decontamination of premises and other works necessary to be conducted for compliance of the building to the requirements set in the design documents for the final state of the dismantled object.

The main objectives of the proposed activity under the “Project 2101” are the following::

- performance of D&D of equipment from Unit 2 reactor working areas R1 and R2; handling of all types of waste generated during the performing of the proposed economic activity by applying such methods that are safe for personnel and the environment;
- assurance of integrity and normal functioning of the systems remaining in operation;
- assurance of maintaining of the radiological status of the equipment, components and building structures that will not be dismantled at the level not higher than prior to the start of D&D work.

As a result of work performance within the scope of 2102 project Unit 2 reactor working areas R1 and R2 will be emptied of the equipment that is not needed any more, thus providing conditions for performance of the following stage of the reactor dismantling “Dismantling and decontamination of equipment from the Reactor R3 zone (project 2103)”. Other D&D of Bld. A-2 equipment will also be performed in parallel with the dismantling works of equipment from Unit 2 reactor working areas R1 and R2 located within the scope of construction boundaries of Bld. A-2 with the major part of Bld. A-2 equipment to be dismantled within the scope of the project “Dismantling and decontamination of Units A-2 and V-2 equipment (project 2210)”.

Dismantling of equipment from Unit 2 reactor working areas R1 and R2 within the scope of Project 2102 will be implemented by application of disassembly, mechanical and thermal cutting methods. The thermal cutting includes oxygen-acetylene and plasma cutting.

The goal of the selection of D&D technology of the Project 2102 is to reduce the collective and individual doses to the personnel in accordance with the ALARA principle, reduce the volume of secondary waste and release of harmful substances into the environment, reduce the amount of radioactive waste and reclassify radioactive waste to the lower class during initial treatment.

When choosing DD technologies, preference will be given to remotely operated methods, if their feasibility and safety are justified.

During the proposed activity approximately 2121,8 tons of equipment will be dismantled. The general composition of to be dismantled waste is shown in Figure 2. The main materials are carbon steel, stainless steel and concrete (iron-barium serpentinite concrete with cast iron powder). The presence of non-ferrous metals and graphite is due to the design of the reactor channels, which include the middle zirconium parts and graphite sets (sleeves and rings).

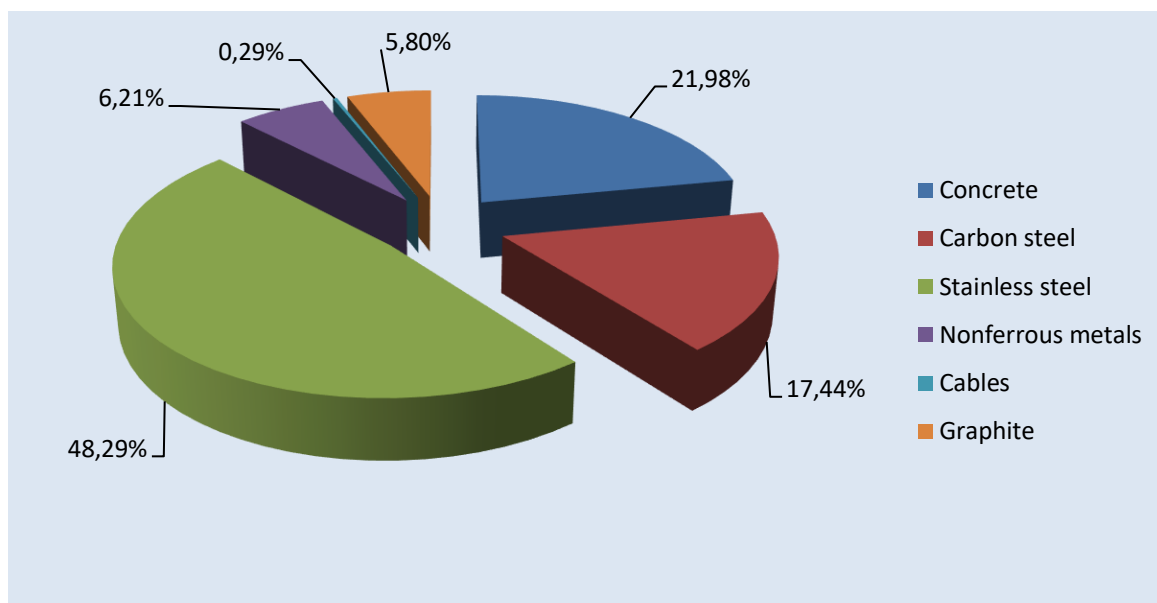


Figure 2. General composition of dismantling waste

In the process of performing of D&D works of the equipment from working areas R1 and R2, radioactive waste of classes A, B, C, D, E will be generated. The classification of radioactive waste is established by the Nuclear Safety Requirements BSR-3.1.2-2017 "Pre-disposal Management of Radioactive Waste at Nuclear Installations", (TAR, 2017-07-31, No. 12866). In accordance with this document, classes A, B and C include short-lived very low-level, low-level and intermediate-level radioactive waste, and classes D and E are long-lived low-level and intermediate-level radioactive waste. The distribution of primary radioactive waste by classes according to BSR-3.1.2-2017 before pre-treatment is shown in Figure 3.

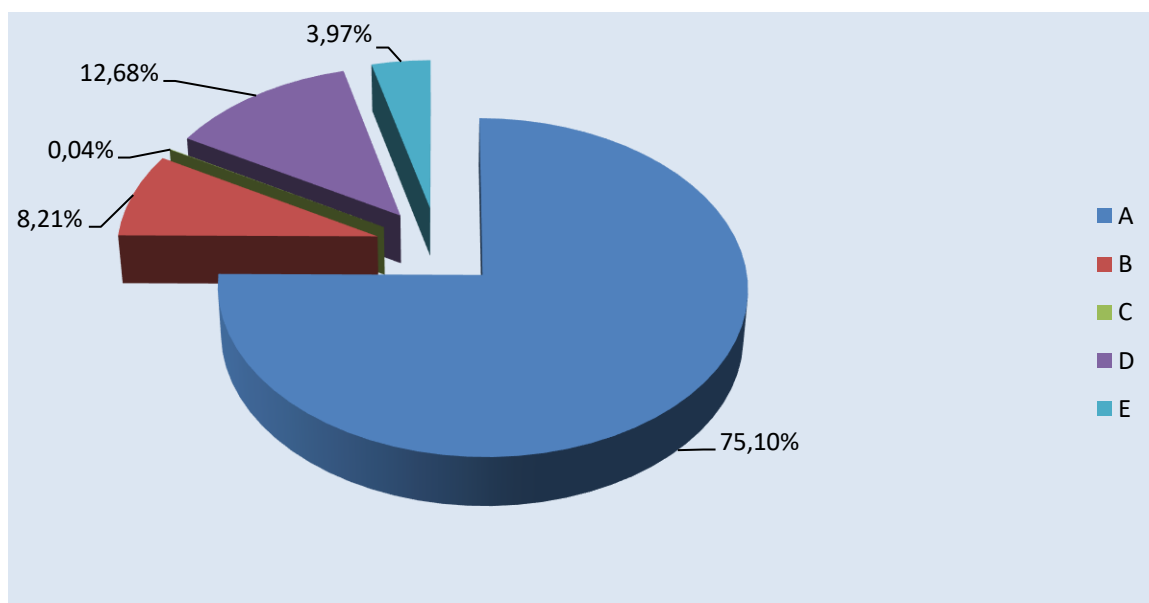


Figure 3. Distribution of primary radioactive waste by classes

Part of the radioactive waste of classes A and B will be subject to decontamination in order to meet the acceptance criteria established for disposal in the Landfill repository (project B19). Decontamination of waste of classes C, D, E will not be performed.

Upon completion of the proposed activity, all dismantled equipment (primary waste), as well as the secondary waste generated during the work will be removed from Building 101/2 for further processing, storage and disposal in the appropriate waste management facilities. Further waste management will be carried out in accordance with the provisions of the documents valid at the INPP, in accordance with their classes:

- Class A waste - disposal in the Landfill facility for short-lived very low-level waste (project B19);
- Class B and C waste - processing and intermediate storage at the SWTSF (project B3/4), followed by disposal in a Near-Surface Repository (project B25);
- Class D graphite waste - intermediate storage in building 158/2 (safety feasibility study was carried out according to the B38 project);
- Class D, E metal waste - processing and intermediate storage at the SWTSF (project B3/4).

In the future, according to the current Radioactive Waste Management Strategy at the INPP, waste of classes D and E will be transported to a Deep Geological Repository. Information on existing and constructed facilities within the framework of projects B19, B3/4, B25 is presented in detail in the presentation “Ignalina Nuclear Power Plant decommissioning” located on the website of the Ministry of the Environment of the Republic of Lithuania.

2. Information on the Spatial Boundaries and Timeframes of the Proposed Activity

Ignalina Nuclear Power Plant is located in the north-eastern part of Lithuania on the shore of Lake Drūkšiai, approximately 140 km from Vilnius – the capital city of Lithuania, near the state borders with Latvia and Belarus at the distance of approximately 8 and 4 km respectively, and approximately 260 km from the state border with Poland (Figure4). The distance to the borders of other states is even greater.



Figure 4. Location of Ignalina Nuclear Power Plant

INPP consists of two power units with RBMK-1500 type reactors (electrical power – 1500 MW). The first power unit was operated from the year 1983 until 31 December 2004, and the second power unit – from the year 1987 until 31 December 2009.

The territory of INPP and its premises are divided into the controlled and observation areas. The impact of radiation on the personnel is possible only in the controlled area, access to which is organized through the sanitary inspection facilities and is limited by administrative means or physical barriers. The radiation hazard factors in the observation area do not exceed the levels defined for the category of persons “Population”, that is practically do not exist.

The Sanitary Protection Zone (SPZ) in the radius of 3 km is defined around the INPP site. There are no permanent residents within the SPZ, as well as the economic activity is limited. The nearest settlement is located at the distance of approximately 3.5 kilometres to the south-west of the site. The boundaries of the INPP SPZ and facilities which are located nearby are shown in Figure 5. The proposed economic activity would not require revision or clarification of SPZ boundaries defined by INPP.

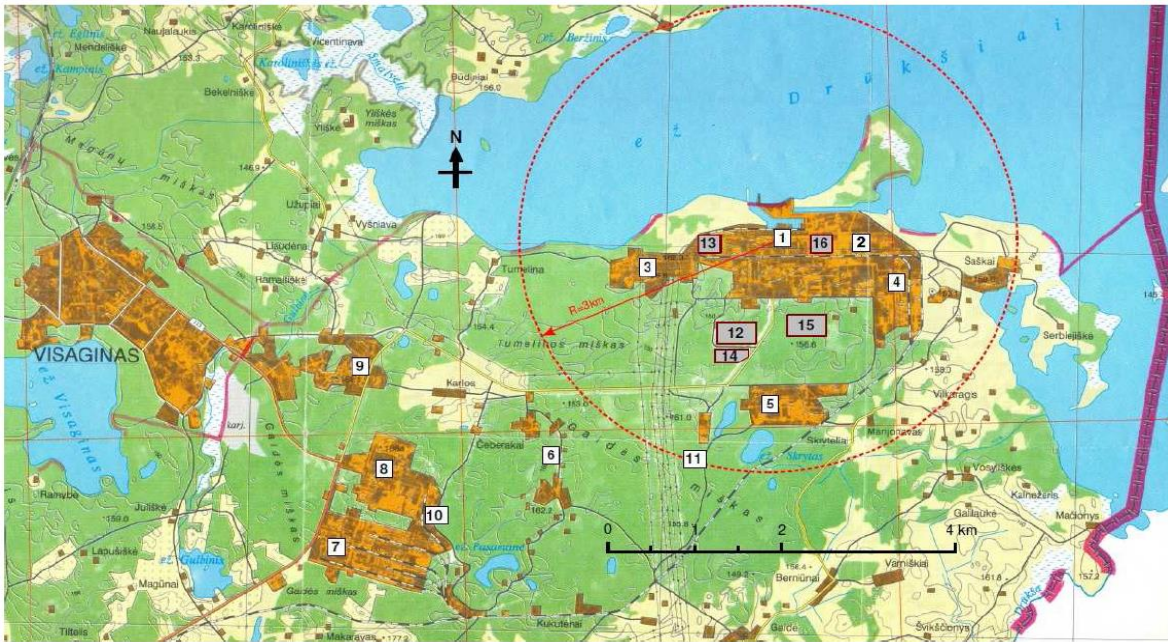


Figure 5. SPZ of Ignalina NPP and the objects located nearby:

1 - INPP Power Units, 2 - Existing Dry type Interim Spent Nuclear Fuel Storage Facility – DISFSF, 3 - Open Switchgear, 4 - Equipment Depot, 5 – Water Treatment Facilities of Visaginas, Transport Department, 6 – Water Intake Facilities for Visaginas, 7 - Construction Base, 8 - Construction Industrial Base, 9 - Former Military Base, 10 - Heat Boiler Station for Visaginas, 11 – Dumping of Household Waste of Visaginas, 12 – New Interim Spent Fuel Storage Facility – ISFSF (B1), and SWTSF (B3/4), 13 – Site of Solid Radioactive Waste Retrieval facility – SWRF (B2), 14 – Site of Landfill Facility for Short-lived Very Low-Level Waste, 15 – Site of Near Surface Repository for Low and Intermediate Level Short-lived Radioactive Waste, 16 – Site of Landfill Buffer Storage and Site of Free Release Measurement Facility. There are shown also the existing SPZ with the radius of 3 km.

The reactor equipment to be dismantled according to this project is located within construction boundaries of Bld. A-2. Unit A-2, together with Units B-2, V-2, D-2 and G-2, is part of Building 101/2 - the main building of INPP Unit 2. The location of Building 101/2 at the INPP site is shown in Figure 6.

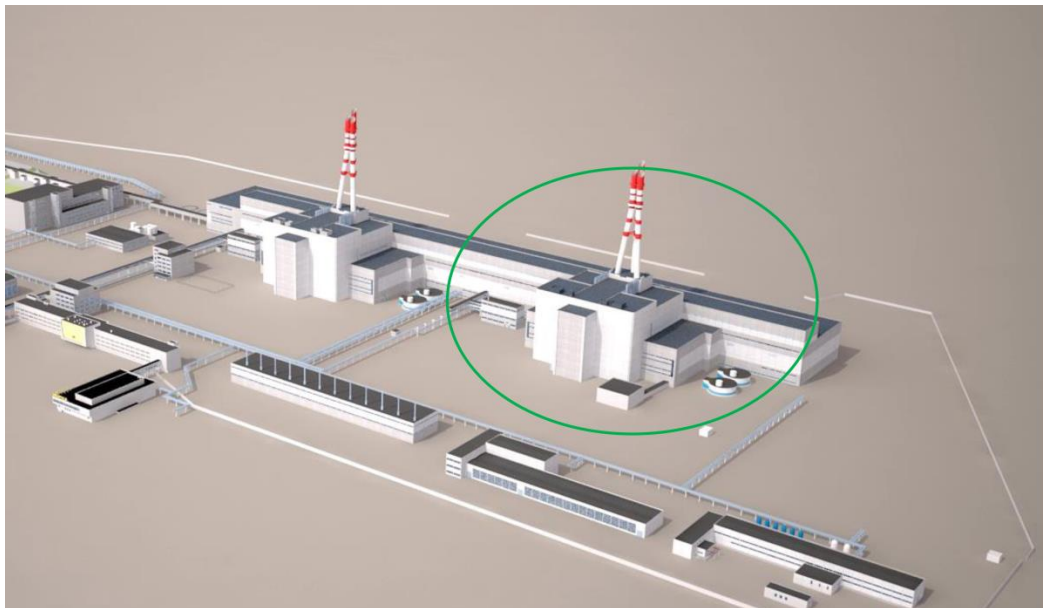


Figure 6. Location of Building 101/2 at the INPP site

The mutual arrangement of units in Building 101/2 is shown in Figure 7.

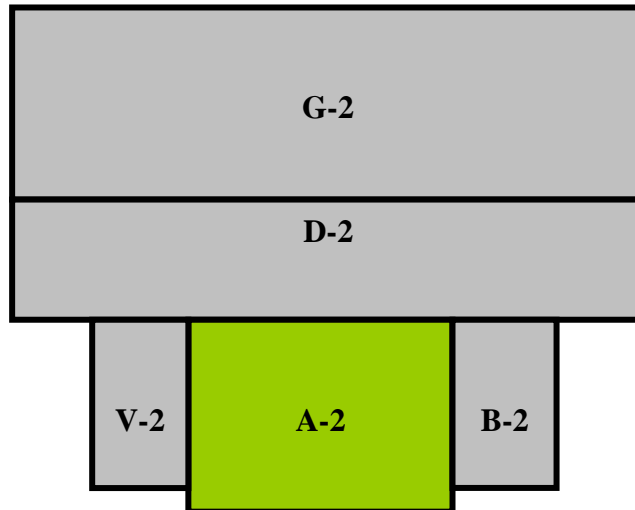


Figure 7. Mutual arrangement of units in building 101/2

Taking into account the design features of the reactor, three zones with radioactive contaminated structures, components and materials were selected - zones R1, R2 and R3. A general view of the working areas R1, R2 and R3 is shown in Figure 8.

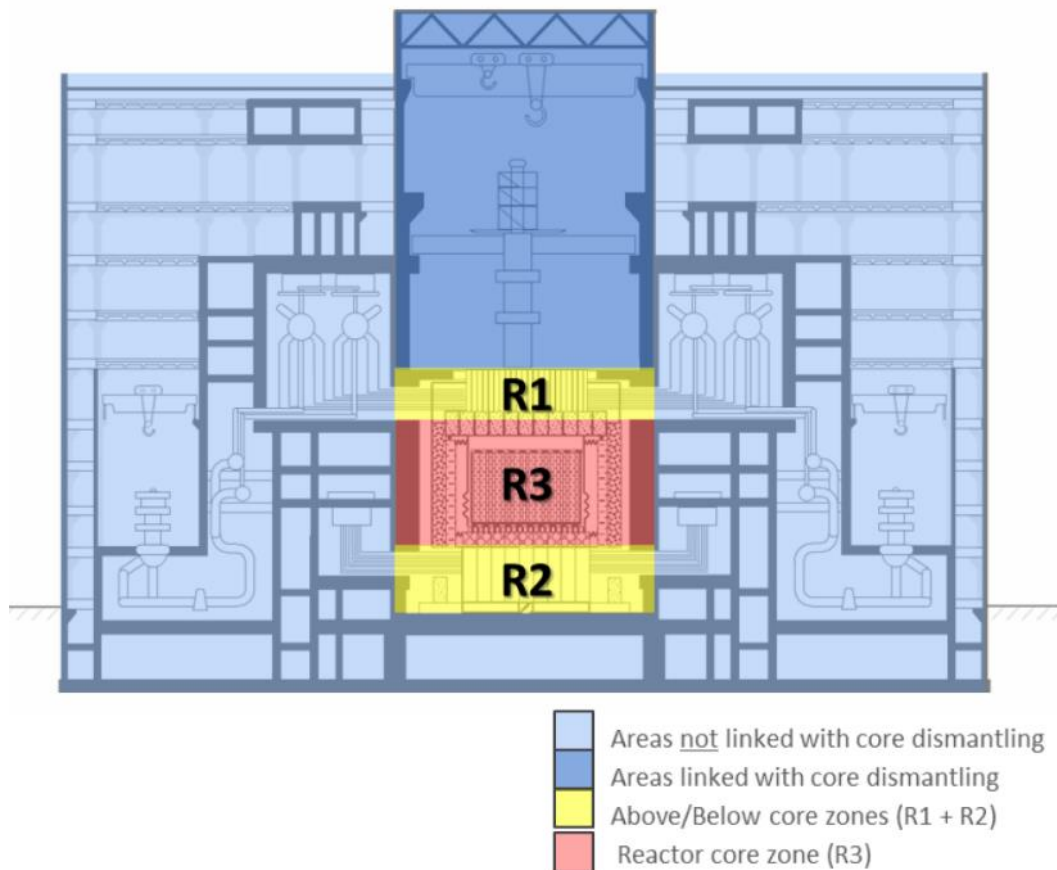


Figure 8. General view of the working areas R1, R2 and R3

Zone R1 - zone in the reactor shaft, room 210 and in part in room 506/1,2 of unit A-2, located above the elevation + 20.70.

Zone R2 - zone in the reactor shaft, room 125 of unit A-2 and in part in room 209/1,2 of unit A-2, located from the elevation + 0.9 m to + 5.95 m.

Zone R3 - the zone in the reactor shaft between the elevations + 5.95 m and + 20.70 in room 210 of unit A-2.

Within the framework of the project 2102, the equipment from the working areas R1, R2 will be dismantled and, thus, conditions for the dismantling of the reactor equipment from the working area R3 will be prepared. The main equipment located in the working areas R1, R2 is the fuel channels, channel paths, steam-water and lower water communications, cables and other smaller equipment located in rooms 125, 209/1,2, 210, 506/1,2 of unitA-2.

Work performance places are equipped with the existing special ventilation systems or mobile filtering units containing highly efficient aerosol filters with the cleaning efficiency not lower than 99.9%. This allows to almost completely prevent the ingress of nuclide-contaminated aerosols into the environmental air.

The preliminary assessment assumes that the proposed economic activity will continue for 6 years – during the period from the year 2023 to 2028.

3. Information on the Expected Impact on the Environment and the Proposed Measures to Mitigate its Consequences

Water Components

The impact of the proposed economic activity on the surface and underground water of the INPP region and neighbouring countries is not expected due to the fact that:

- the proposed economic activity will be carried out in the controlled area of the INPP industrial site;
- it is not planned to increase the consumption of underground and surface water, therefore an impact on the hydrology of the region will not occur;
- the ingress of uncontrolled water discharges to the environment during the proposed economic activity under the normal operating conditions is excluded;
- industrial water discharges will be treated as potentially radioactive discharges in order to completely eliminate the possibility of radionuclides ingress into the environment. For this purpose, the water discharges will be pumped to the INPP Liquid Radioactive Waste Treatment Facility. Thus, the possibility of environmental pollution will be eliminated;
- sewage water will be collected by the wastewater collection system and pumped for the treatment to the Water Treatment Facilities of SE “Visagino energija”. As the work will be performed by the INPP existing staff, the increase in the amount of discharges from INPP is not expected if compared with the existing situation;
- surface water from the INPP territory will be discharged into the environment (Lake Drūkšiai) through the industrial-surface water drainage channels equipped with mechanical oil retaining devices;
- the proposed activity will be performed outside the SPZ of the Water Intake Facilities and Boreholes of Visaginas town located approximately 3 km to the south-west from the INPP site. The drinking water sources of the Daugavpils district of Latvia and the Braslav district of Belarus are located at much greater distance (Figure 9);
- INPP assures continuous monitoring of ground water, monitoring of the surface and industrial water discharges into Lake Drūkšiai, monitoring of Lake Drūkšiai.

Measures on the impact reduction from the proposed economic activity are not envisaged due to absence of such impact.

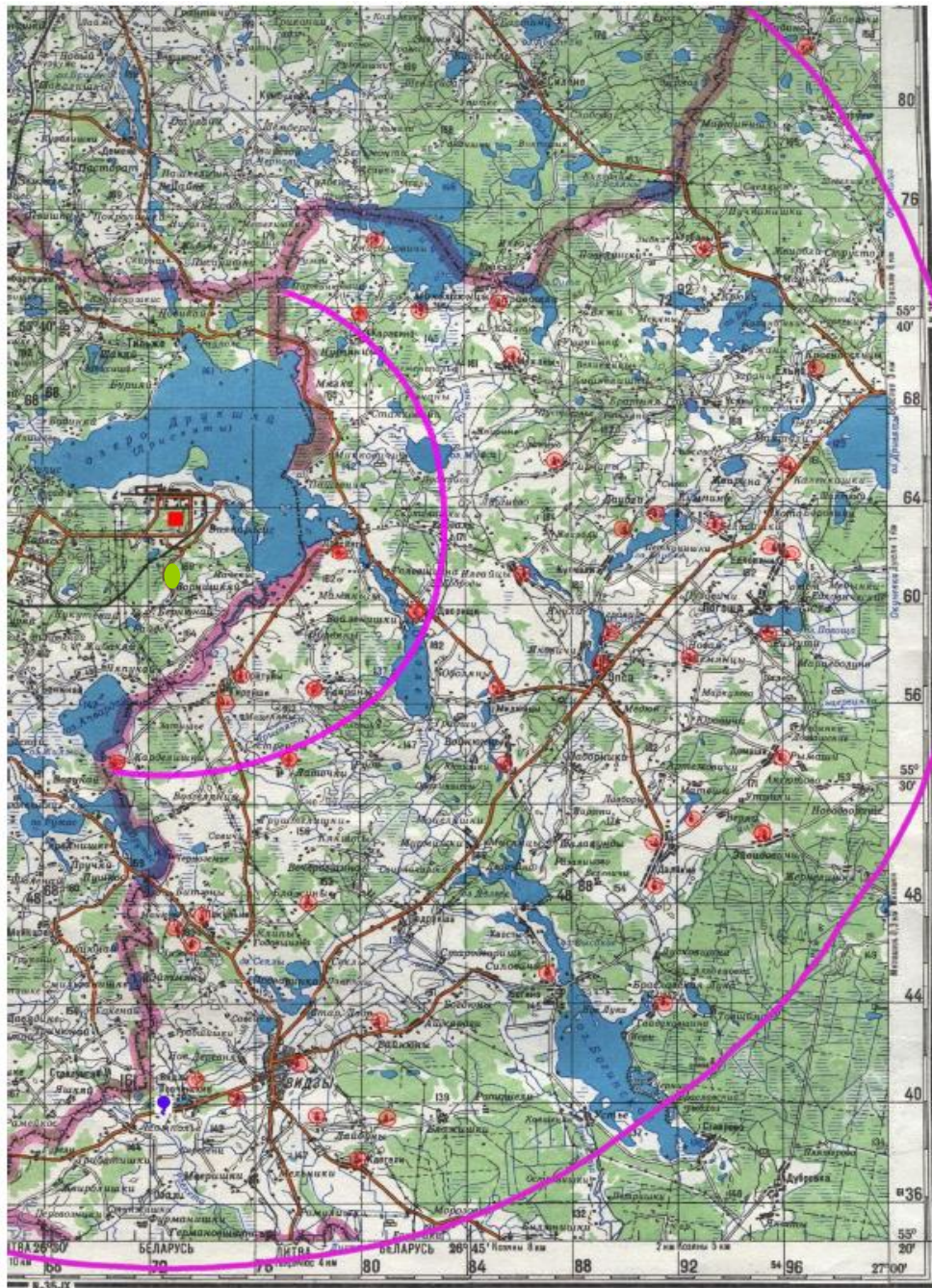


Figure 9. Settlements and drinking water sources in the territory of the Republic of Belarus, at 10 km and 30 km distances from INPP

Environmental Air

Non-radiological Impact

During performance of the proposed economic activity the air pollutants will originate due to cutting of dismantled equipment and during transportation of dismantling and decontamination materials. The emissions from cutting of equipment (in the form of aerosols) will almost completely be caught by the existing highly efficient cleaning systems of emissions with the exception of only gaseous emissions of CO and NO_x which are not trapped by the cleaning system. However, their amount will be insignificant. The concentration of pollutants in the environmental air as a result of implementation of the proposed activity neither will exceed the air pollution threshold values established by the requirements of normative documents, but will also be significantly below the established limit values.

The motor vehicles carrying dismantling and decontamination materials will not cause any significant impact on the environmental air quality. The transport traffic will be carried out only within the boundaries of the INPP industrial site.

Therefore, the proposed economic activity on D&D of the Project 2102 will not have negative impact on the environment of the Braslav district of Belarus and Daugavpils region of Latvia.

No special measures to mitigate the impact to the environmental air in addition to the measures that will be scheduled in the technological project of D&D.

Radiological Impact

The possible radiological impact of the proposed economic activity on the environment components outside of SPZ is estimated as very low. Based on the completed assessment, the maximum annual effective dose to the representative (the member of the critical group of population) will be $7.47\text{E-}06$ mSv for the normal operating conditions which will amount to $7.47\text{E-}03\%$ of the dose constraint for airborne discharges – 0.1 mSv. In case of the INPP, the representative is assumed as the residents who live or undertake activity on the boundary of the SPZ and the INPP monitoring zone.

The analysis of incidents that may arise during the implementation of the proposed activity of the Project 2102 proved that their possible negative effects will impact only the personnel directly performing the works at the workplaces within the premises of the main building of Unit 2 – Building 101/2. Considering that all workplaces in Unit A-2 premises are equipped with highly efficient cleaning systems of emissions, in case of any incidents the increased impact to the environment will not be originated. The maximum impact to the personnel in case of incidents during the radiation-hazardous work will be the following: due to radioactive substances contact with the skin – the maximum exposure dose to the skin amounts to 1.46 mSv, which is 0.3% of the permissible annual values (500 mSv). The works associated with transportation of RAW packages generated during the proposed economic activity by the inner INPP site roads – from Building 101/2 to the RAW treatment facilities are not included into the scope of the Project 2102. The analysis of the incidents related to damage of RAW packages during their transportation by the internal INPP site roads is performed for specific classes of RAW in the previously prepared documents approved in accordance with the established procedure: EIA Reports and SAR for the RAW treatment and storage facilities in B10, B3/4, B19, B25, bld. 158/2. In relation to this project, it can be noted that in case of the most severe incident associated with the drop and damage of the transport container G-2 filled with waste of Class B and C, the potential impact to the representative (the members of the critical group) at the borders with the Republic of Latvia and the Republic of Belarus will be the following:

- the effective exposure dose at the border with the Republic of Latvia – $7.67\text{E-}04$ mSv;
- the effective exposure dose at the border with the Republic of Belarus – $1.03\text{E-}03$ mSv.

In order to protect the personnel, residents of the Republic of Lithuania and neighbouring states against the consequences of the potential radiological accidents outside the SPZ boundary, INPP is continuously planning and developing the emergency preparedness measures. In case of exceeding of radioactive substances dispersion norms established for the normal conditions of nuclear facility operation outside the SPZ, the INPP Emergency Preparedness Plan will enter into force and the radiological situation survey within the SPZ and outside its boundaries will be performed. Based on the current state of affairs, measures dedicated for protection of the inhabitants outside of the SPZ shall be performed, as well as the measures related to limitation of the personnel exposure doses.

Considering that the radiological impact due to the proposed economic activity to the environment is significantly below the radiological impact estimated in case of beyond design basis accidents in the INPP Emergency Preparedness Plan, it can be stated that the proposed

economic activity will not have effect on the environment components of the Braslav district of Belarus and Daugavpils region of Latvia, which are located at a more distant location from the source of possible emissions.

The proposed project solutions include the concept of different barriers for localization, containment and collection of airborne radioactivity in order to prevent any significant radioactive releases into the industrial environment and/or atmosphere.

During the implementation of the proposed activity the monitoring of the actual radioactive emissions into the working premises and the environmental air will be carried out.

Soil

The proposed economic activity of the Project 2102 will be performed within the INPP industrial area, so the impact to the soil and the geological structure of the subsoil of the Braslav district of Belarus and the Daugavpils region of Latvia is not considered. In the absence of any impact due to the proposed economic activity no additional measures to reduce that impact are considered.

INPP Environmental Safety Division provides the continuous monitoring of the soil, groundwater, monitoring of the water discharges into Lake Drūkšiai, monitoring of Lake Drūkšiai.

Underground (Geology)

As any construction works, new foundations, refilling and ground movement will not be performed during the implementation of the proposed economic activity, no additional impact on the geological ground structure is expected. No hazardous materials or water discharges will be discharged directly (without seepage through the soil or subsoil) or indirectly (seepage through soil or subsoil). The underground cavities will not be used for storage or disposal of any toxic materials.

The proposed economic activity of the Project 2102 will not impact on the underground geology of the Braslav district of Belarus and the region of Daugavpils region of Latvia.

Biological Diversity

The proposed economic activity of the Project 2102 will be carried out in the territory of the INPP industrial site, where no species of flora and fauna that are protected by the relevant legal acts of the Republic of Lithuania and the EU are found. The impact from the proposed economic activity on the biological diversity outside of the INPP industrial site territory will be quite small and only associated with the exhaust fumes, noise and light signals of motor vehicles. The movement of machinery is expected only at the daytime and it will not change the existing traffic intensity.

In the territories of the Braslav district of the Republic of Belarus and the Daugavpils region of Latvia the originated noise will not be heard, as these regions are at the distance not less than 5 km from the INPP site.

INPP Environmental Safety Division provides continuous monitoring of radionuclide content in samples of vegetation, vegetables and food products selected in the INPP region.

Landscape

The proposed economic activity will be carried out within the INPP industrial site and do not include any construction or demolition works, as well as other works which may affect the landscape of the INPP site and outside of the site. There will be no impact on residential areas and recreation areas.

Social and economic environment

The proposed economic activity will be carried out within the industrial area in a distant location

from places of permanent residence in Latvia and Belarus. Impact on the population of Latvia and Belarus or apparent changes in the social economic conditions is not predicted.

D&D work of the Project 2102 will be carried out in strict accordance with the national normative documents consistent with the legal basis of the EU, the requirements of international organizations such as the IAEA, established recommendations and conventions, and in addition, under the supervision of the regulating institutions of the Republic of Lithuania.

INPP possesses sufficient industrial resources, qualified personnel and experience in implementing similar D&D projects in order to be able to perform D&D work of the Project 2102.

D&D work of the Project 2102 will be carried out in accordance with the latest environmental requirements, by applying the state-of-the-art technology, the principles of radioactive waste management defined by the IAEA, and the existing good practices of the European Union countries.

Cultural Heritage

The proposed economic activity will be carried out within the INPP industrial site and will not affect the objects and the zone of cultural heritage of Latvia and Belarus.

Public Health

Non-radiological Impact

The proposed economic activity will be carried out within the INPP industrial site. The SPZ with the radius of 3 km is defined around the INPP. There are no permanent residents in this zone. The nearest settlements are at a considerable distance from INPP, therefore the impact from D&D work or transportation of freights on the site will be insignificant.

The potential impact from the proposed economic activity will be minimized using high efficiency filters; in addition, good conditions for the dispersion of pollutants will be assured. Considering the fact that the nearest settlements are at a more distant location from the site of the proposed economic activity, the impact on the health of the population in the INPP region is not expected.

Other important factors that may affect the health of the population in the INPP region during the implementation of the proposed economic activity is not expected.

Therefore it could be stated that the proposed economic activity will not have a significant negative impact on the health of the population of the Braslav district of Belarus and the Daugavpils region of Latvia.

Radiological Impact

Based on the performed assessment of radiological exposure of the population due to the potential emissions of radioactive substances into the atmosphere during the proposed economic activity, the maximum annual effective dose to the representative (the member of the critical group of population) will be $7.47E-06$ mSv, which will amount to $7.47E-03\%$ of the annual dose constraint set for the emissions – 0.1 mSv, i.e. half of the dose constraint of 0.2 mSv. The potential radiation exposure of the population in neighbouring states will be even lower due to the more distant location of it from the source of emission.

A comparative evaluation of the negative impact of the INPP activity on the environment during the operation period and during the period after the final shutdown of the power units and the transition period to the decommissioning is presented in the diagram evaluating the exposure dose to the representative due to gas-aerosol discharges and waterborne discharges from INPP (Figure 10).

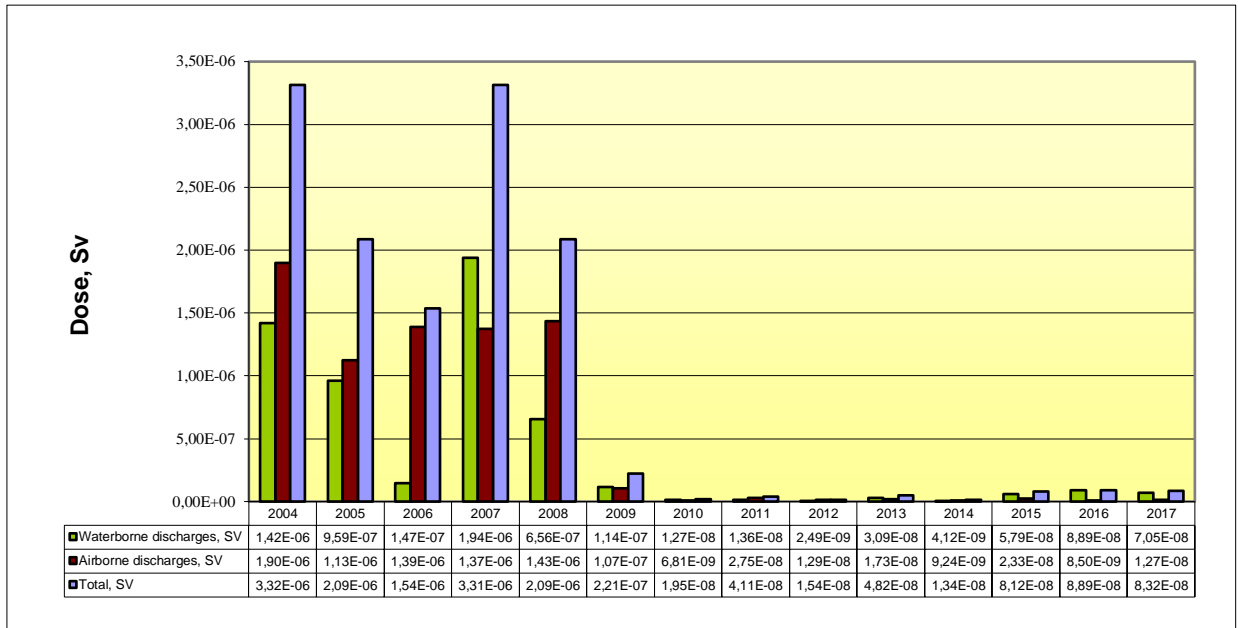


Figure 10. Annual effective dose to the representative due to airborne and waterborne discharges from the INPP for 2004-2017 years

It is obvious that since 2010, when the main activity of the INPP became the decommissioning process, the radiation exposure to the representative significantly decreased. During the period since 2010, several projects on D&D of INPP Units 1 and 2 equipment either have been implemented or are continued to be implemented (Building 117/1, Building 117/2, Units G-1, G2, V-1, D-1, D-2, D-0) and have not caused or do not cause currently any noticeable increase in the negative impact on the environment.

The analysis of expected changes in radionuclide releases allows to conclude that the proposed economic activity do not worsen the existing radiological situation outside of the INPP site.

Since no additional radiological impact on the population of the neighbouring states due to the implementation of the proposed economic activity will occur, no measures to mitigate this impact are required.

The Impact of the Proposed Economic Activity on the Environment AS Compared to the Impact from All Nuclear Facilities (NF) on the INPP Site

Estimation of the annual effective dose to the representative due to the radiological impact of airborne and waterborne discharges from the existing INPP NFs for the period of years 2019-2029, is presented (in mSv) in Table 1.

The total annual effective dose to the representative from all NFs on the INPP site does not exceed the annual dose constraint for airborne and waterborne discharges – 0.2 mSv, which is established by the normative documents for the NF, and the maximum estimated value for the year 2020 is about 0.0021 mSv which is 94.9 times less than the annual dose constraint.

The maximum estimated annual dose of the representative due to the proposed economic activity impact for the year 2024 will be equal to 7.47E-06 mSv, that will amount to 4.61E-02 % of the total annual effective dose to the representative due to radioactive exposure (airborne and waterborne discharges) on the environment from existing NFs on the INPP site – 0.0162 mSv in the year 2024.

Therefore, it can be stated that the impact of the proposed economic activity to the environment within the INPP SPZ is negligible. Consequently, the additional radiological impact on the population of the neighbouring states as a result of the implementation of the proposed economic activity will not occur.

Explanations to the Table 1:

- U1DP0 - Decommissioning Project for INPP Unit 1 Defueling Phase (includes all kinds of activity, except D&D of equipment and construction of new facilities);
- U2DP0 - Decommissioning Project for INPP Unit 2 Defueling Phase (includes all kinds of activity, except D&D of equipment and construction of new facilities);
- Project 2207 - D&D of Unit G-1 equipment;
- Project 2208 - D&D of Unit G-2 equipment;
- Project 2214 - D&D of Units D-1 and D-2 equipment;
- Project 2203 - D&D of Unit A-1 equipment;
- Project 2101 - D&D of lower and upper communications of the reactor systems of Unit 1;

Projects on construction of new facilities – B1, B2, B3/4, B19, and B25 (information on existing and under constructed facilities within the framework of projects B1, B2, B3 / 4, B19, B25 is presented in detail in the presentation “Ignalina Nuclear Power Plant decommissioning” located on the website of the Ministry of the Environment of the Republic of Lithuania.)

Transboundary environmental impact assessment carried out for the new INPP nuclear facilities that the Republic of Latvia and Republic of Belarus participated:

- B1 project – Interim spent fuel storage facility. In 2007 the Republic of Latvia and the Republic of Belarus participated in the transboundary environmental impact assessment process, comments and proposals were provided, public hearing was held in Daugavpils on 13 March 2007 and in Vidzy, on 19 April, 2007, respectively.
- B2/3/4 project – Solid radioactive waste management and storage facilities. In 2008 the Republic of Latvia and the Republic of Belarus participated in the transboundary environmental impact assessment process, public hearing of the EIA report was held in Daugavpils on 13 March 2008 and in Vidzy, on 17 May, 2008, respectively, comments and proposals were provided, transboundary consultations with experts of the Ministry of Environment and the Radiation Protection Centre of the Republic of Latvia were held in Vilnius on 4 June 2008 and on 06 June 2008 the transboundary consultations with the experts concerned of the Republic of Belarus was held in Vilnius.
- B19 project – Very-low-level short-lived radioactive waste Landfill facility. In 2008 the Republic of Latvia and the Republic of Belarus participated in the transboundary environmental impact assessment process, the EIA programme was presented for analysis and comments and proposals were provided by the parties concerned. Later, in 2009 the EIA Report was provided, public hearing of the EIA report was held in Daugavpils on 22 April 2009, no comments were provided. No comments from the Republic of Belarus were received also.
- B25 project – Low- and intermediate-level short-lived radioactive waste near surface repository. In 2005 the Republic of Latvia participated in the transboundary environmental impact assessment process, public hearing of the EIA report was held in Daugavpils on 9 June 2005, public hearing of the updated EIA report was held in Daugavpils on 12 December 2006 and comments were provided; concluding transboundary consultations with experts of the Ministry of Environment and other institutions of the Republic of Latvia were held in Vilnius on 16 March 2007, provided comments and the state position were overviewed.
 Since the Republic of Belarus joined the Espoo convention only at the end of 2005, the information on the propose activity was provided on a good neighbourhood basis. The meeting on this issue was held in May 2005, on 21 December 2006 the updated EIA Report was presented to the public in Braslav. On 5-7 February 2007 the meeting of the working groups was held in Visaginas and on 19 April 2007 the concluding transboundary consultations with the experts of the Republic of Belarus was held, the provided comments and the state position were overviewed.

4. The Initiator

The organizer of the proposed economic activity is **the State Enterprise Ignalina Nuclear Power Plant**:

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Responses to the Questions and Comments of the Republic of Belarus regarding transboundary environmental impact assessment procedure for the project 2102 “Dismantling and decontamination of equipment from Ignalina Nuclear Power Plant Unit 2 reactor R1 and R2 zones”

Find below the explanations and responses to the questions and comments of the institutions of the Republic of Belarus to the information provided within the frame of the transboundary environmental impact assessment procedure for the project 2102 “Dismantling and decontamination of equipment from Ignalina Nuclear Power Plant Unit 2 reactor R1 and R2 zones”. The responses are provided under the same numbering as the questions and comments have been provided.

1. Since the entire Ignalina NPP decommissioning process is extended over the long period of time (2004-2038) and is subdivided into numerous projects (equipment dismantling and decontamination, construction of new radioactive waste treatment and storage facilities, spent nuclear fuel storage facility, demolition of redundant building, etc.) having their own time schedule, scope, planned activities and their safety analyses and environmental impact assessments, interrelations to other decommissioning activities and each of which is subject to the EIA procedure, during development of the EIA Programme (agreed in 2004) it was decided to develop a separate EIAR for each of such of the decommissioning project by taking into consideration the potential cumulative impact of all the activities carried out on the INPP site within the analysed period of time. Thus, such evaluation of the cumulative impact is always made and included into the EIAR while assessing the impact to the human health (see Table 1 in the Non-Technical Summary).

Since year 2000, when the works related to the decommissioning of the Ignalina NPP were started, the INPP has performed 15 environmental impact assessments of the planned economic activity, and the responsible agency have adopted 15 positive decisions on the permissibility of such activity. Part of these decisions (construction of all new NFs) was adopted in accordance with the provisions of the UN Convention on Environmental Impact Assessment in a Transboundary Context (Espoo) following the transboundary consultations with the exception of the equipment dismantling and decontamination activities. Since only on 23 October 2017, upon the entry into force of the amendment to the Convention on Environmental Impact Assessment in a Transboundary Context (hereinafter referred to as the Espoo Convention), the list of activities subject to a transboundary environmental impact assessment has changed, therefore, when planning to start carrying out an activity specified in Article 1(2)(b) of the Espoo Convention (nuclear power stations and other nuclear reactors, including the dismantling or decommissioning of such power stations or reactors (except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load) or projects, which are an integral part of such activity, the transboundary environmental impact assessment procedures shall be performed in accordance with the procedure established by the Law on Environmental Impact Assessment of Proposed Economic Activities of the Republic of Lithuania. Therefore, the environmental impact assessment of the aforementioned D&D projects is subject to be conducted in the transboundary context.

The information in the presentation „INPP Decommissioning Key Projects“ (hereafter referred to as the presentation) is presented in such a way that the information on all the INPP decommissioning projects carried out by the INPP is presented in the introductory part of the presentation in order to give the general view of the entire decommissioning process. The information related to the planned economic activity (project 2102), for which the present transboundary assessment is performed is briefly presented on pages 22-26 of the presentation (Unit 2 reactor R1 and R2 zones equipment dismantling). The list of the main equipment to be dismantled within the scope of the project 2102 is presented on page 24 of the presentation. More detailed information on the equipment to be dismantled within the scope of the project 2102 is presented in the Non-technical Summary.

We would like to pay your attention that handling of the spent nuclear fuel assemblies and radioactive waste is out of the scope of the project 2102 and is a part of the project B1 and other decommissioning projects.

Summary information on the transboundary assessment of the project B1 and other new nuclear facilities is presented on page 17 of the Non-Technical Summary. The transboundary assessment of these projects was conducted strictly following the Espoo convention and the work within the scope of these projects is being carried out.

1.1. We would like to pay your attention that the given comment is not related to the project 2102 under consideration.

It should be noted that the project 2102 for which this transboundary EIA procedure is conducted is not related to the spent nuclear fuel handling either at the Units, or at the Interim Spent Fuel Storage Facility (B1 project). The transboundary EIA procedure for B1 project was conducted in 2007 and the Republic of Belarus participated in the transboundary environmental impact assessment process. Besides, the report on the implementation of the **post-project analysis** for the new Ignalina NPP nuclear installations for which transboundary environmental impact assessment has been carried out pursuant to the Convention on Environmental Impact Assessment in a Transboundary Context of the United Nations Economic Commission for Europe (Espoo, 1991), in order to ascertain that operation of nuclear installations newly constructed on the Ignalina NPP site does not have and will not have significant adverse transboundary impact and is in line with the assessments and safety substantiations made during the environmental impact assessment and safety analysis stage is provided to the Republic of Belarus on an annual basis.

Nonetheless, find below the information of interest to you:

- 988 SFA were transported to Unit 2 from Unit 1 for reuse.
- As of 30 July 2021, 153 SFA remain at Unit 2 (cooling pools). The deadline for transportation of all of the damaged fuel to the ISFSF is III rd quarter of 2022.

1.2. We would like to pay your attention that the given comment is not related to the project 2102 under consideration.

See answer to the previous comment. The safety justification and design documents of the equipment for handling of the damaged and experimental fuel assemblies including all aspects related to the risk assessment during the handling process were performed within the scope of the safety case development and were approved by the regulatory body, including performance of the “Hot” trial in accordance with the Commissioning Programme and approval of the Report and the Final Safety Analysis Report.

Nonetheless, find below the information of interest to you: handling of the damaged fuel and the environmental impact assessment was provided in the Environmental impact assessment report of the project B1 in 2007. Following the successful completion of the “Hot” trial of the damaged fuel handling system (DFHS) and safety justification of the DFHS operation, the VATESI issued the license to the INPP for the industrial operation of the system at Units 1 and 2.

Leaking SFAs are already loaded into casks (standard loading configuration – 91 SFA per cask). The total amount of SFA handled at Unit 1 is 169 and 158 SFA - at Unit 2.

From September 2020 till April 2021 182 damaged SFAs were handled and loaded into 11 casks at Unit 1 (18 SFAs per cask).

In May 2021 handling of damaged SFAs started at Unit 2. As of 30 July 2021, 153 SFAs need to be transported to the ISFSF out of the total number of 189, i.e. to be loaded into 9 casks.

1.3. On 9 June 2020 during the planned handling of the spent fuel assemblies (SFA) in the cooling pool of Unit 2 it was noticed that movement of one SFA is different from movement of other SFA. In order to clear out the reasons of deviation, the work was stopped and the underwater part and the

bottom of the cooling pool was inspected by the video camera and the flashlight. During the inspection it was identified that:

- There were no bottom and top fuel bundles (BFB and TFB) on the central rod (CR) of the SFA;
- BFB and TFB were on the bottom of the pool one on the other in the form of letter X;
- Good visibility and absence of spreading of sediments in the area of BFB and TFB indicated that BFB and TFB have already been on the bottom for a long period of time;
- Samples of the water from the pool indicated no increased radioactivity what, in its turn, indicated that fuel bundles did not lose their leaktightness;
- Absence of leaks through the cooling pool cladding indicated that the bottom of the pool was not damaged due to falling of BFB and TFB.

This event was analysed by the special INPP commission by drawing the report on the event. The history of the SFA from the moment of obtaining (March 2005) till the moment of its placement to the final storage place (May 2018) was analysed in the report. It was admitted by the commission that the most probable cause of degradation of the CR was either the hidden fault (crack) or its formation while the SFA was working in the reactor leading to further development of this crack while SFA was in the reactor and/or long-term storage. The following indicate the correctness of such prediction:

- The location of cracking is in the area of thermal impact of the factory welding seam;
- Absence of residual deformations and other signs of impact on the CR of the major braking or bending strengths;
- Absence of any items or structures in the pool that would lead to origination of such strength in case of hooking to such structures.

Separation of BFB and TFB from the CR happened not earlier than on 15 April 2019, as the planned video inspection of the pool was performed on this day.

The conclusions of the report were approved by the VATESI. The event was rated as 0/below the scale in accordance with the International Nuclear Events Scale (INES). In compliance with the Corrective measures of the report, the SFA will be retrieved by the end of this year following the programme approved by the VATESI.

2. Potential risks in case of an accident were analysed in detail in Chapter 8 of the EIAR „Risk Analysis and its Assessment“. The analysis of potential incidents leading to radiological impact on the personnel, population and the environment, as well as the incident not related to such radiological impact was performed in this chapter. Risk analysis was performed following the requirements of the Republic of Lithuania stated in the Procedure for Drafting of the Environmental Impact Assessment Programme and Report. In compliance with this document all potentially probable to occur incidents during the planned economic activity in the scope of the project 2102 were analysed and classified and the potential risk was screened and rated. The classification was carried out taking into account the following factors:

- Consequences to health and life;
- Consequences to the environment;
- Consequences to the property;
- Accident development speed;
- Probability of occurrence of the accident;
- Priority of the consequence.

As a result, all potential consequences were analysed, as well as preventive measures and the measures mitigating the impact to the acceptable level were also analysed. Taking into account the above mentioned, the bounding scenarios (the most severe incidents for the given type of the risk) were selected and the detailed analysis of these scenarios was performed, including the impact

assessment. The following incidents were selected for the project 2102:

- Incident related to the personnel exposure due to impact of the radioactive material to the skin;
- Incident related to the drop of container G2 filled with the waste of classes B and C inside the Bld. 101/2;
- Incident related to the failure of the ventilation in the working areas R1 and R2 of the reactor;
- Incident related to the drop, damage and spill out of waste of class A during the container transportation on the INPP site following the set route of the transportation;
- Incident related to the drop, damage and spill out of waste of classes B and C during the container transportation on the INPP site following the set route of the transportation;
- Incident related to the drop, damage and spill out of waste of classes D and E during the container transportation on the INPP site following the set route of the transportation.

The analysis of incidents associated with the damage of containers filled with corresponding class of waste during their transportation along the internal roads of the INPP site has been performed in the following documents earlier developed and approved in the prescribed order: EIAR and SAR of radioactive waste management and storage facilities - B3/4, B19, B25 and Bld.158 (project B-38). Respectively, the EIAR of the project 2102 contains all such assessments for waste of classes A, B, C, D and E.

Particularly, the EIAR of the project 2102 contains the assessment of the incident related to the drop of G3 container filled with the waste of class E, which was performed within the frame of the project B3/4 and is presented for the purpose to demonstrate that event this bounding scenario does not lead to exceeding of the limits of the radiological impact on the population set in the normative documents.

In fact, the transportation container K-190 with the capacity of 0.04 m³ will be used for the rather small volume of the waste of class E to be generated as a consequence of equipment dismantling within the scope of the project 2102, whereas the consequences assessment was performed for the transportation container G3 of much higher capacity of 0.334 m³. Use of the container K-190 for the purpose of the project 2102 is conditioned by the fact that the same equipment and the same methods for the transportation of the waste of class E will be used as it was earlier, i.e. during the INPP operation and their use is justified by the INPP design.

Considering the fact, that for the purpose of transportation of the waste of classes B and C to be generated within the frame of the project 2102, the container G2 will be used which is of much higher capacity (2.2 m³) than the container K-190, and the volume of the waste of classes B and C to be generated within the frame of the project 2102 is much higher than the volume of the waste of class E to be generated, the consequences of the latter incident is presented in the Non-Technical Summary as the most significant.

Risks related to the external initiating events due to complicated meteorological conditions and natural phenomena (e.g., earthquake, flooding, extreme weather conditions, etc.), as well as human activity (e.g., external fire, plane crash, etc.) were not analysed in the present EIA report, since such risks related to the external initiating events were analysed for the entire INPP in the Safety Analysis Report of Unit 2 for the final shutdown and defueling stage. The document was agreed with the regulatory body of the Republic of Lithuania (VATESI) following the established procedure.

3. It is stated in the Non-Technical Summary (pg. 11):

“The possible radiological impact of the proposed economic activity on the environment components outside of SPZ is estimated as very low. Based on the completed assessment, the

maximum annual effective dose to the representative (the member of the critical group of population) will be $7.47E-06$ mSv....”.

Therefore, it means that this annual effective dose to the representative refers only to the dose conditioned by the releases as a consequence of implementation of the project 2102.

It is also stated in the Non-Technical Summary (pg. 14):

“A comparative evaluation of the negative impact of the INPP activity on the environment during the operation period and during the period after the final shutdown of the power units and the transition period to the decommissioning is presented in the diagram evaluating the exposure dose to the representative due to gas-aerosol discharges and waterborne discharges from INPP (Figure 10).”

Therefore, in this case the annual effective dose to the representative due to airborne and waterborne discharges from the entire INPP activities and facilities (including all projects) is referred to.

4. In compliance with the procedure laid down for development of the EIAR in the Procedure for Drafting of the Environmental Impact Assessment Programme and Report, the impact of the planned economic activity is analysed for both, normal operating conditions and during the potential incidents.

The normal operating conditions are analysed in chapter 4 of the EIAR of the project 2102 “Expected Impact of the Planned Economic Activity on Different Components of the Environment and the Proposed Measures to Mitigate its Consequences”. The potential incidents are analysed in chapter 8 of the EIAR “Risk Analysis and its Assessment”. Correspondingly, the annual effective dose of the representative during the normal operating conditions is provided in chapter 4, which is equal to $7.47E-06$ mSv, whereas in chapter 8 the potential impact in case of incidents is provided. Comparison of these two values will not be demonstrative.

It also should be noticed that for the purpose of assessment of the radiological impact in case of an emergency situation, the most severe (conservative) assumptions are accepted and could also serve as the explanation for the significant difference if compared to the results obtained for the normal operating conditions.

The incidents related to the waste of different classes (A, B, C, D, E) were analysed in detail in the SAR of the projects B-19, B-2,3,4 and are presented in the EIAR of the project 2102 as the bounding scenarios (see comment 2, above).

Find below the initial data and the methodology used for the dose assessment for the incident related to the drop of G2 container filled with the waste of classes B and C:

The incident related to drop of G2 container filled with waste of classes B, C was assessed in the frame of the safety analysis of the new INPP Solid Waste Treatment and Storage Facility (project B3/4). For the purpose of modelling, drop and damage of G2 transport container filled with the waste of classes B and C is assumed. The maximum expected drop height is about 11 m, while the safe container drop height is lower. G2 container, as well as G1 and G3 containers are designed following the IP2 standard and shall withstand a drop of 1.2 m. The accident considerations assume the worst conditions - total damage of the waste container and spill out of the entire G2 waste content. As consequence the accident results in generation of airborne activity which is dispersed outside the INPP site thus resulting in exposure of the representative of the population.

In case of accidents leading to radionuclide release, the calculation of the atmospheric dispersion of released radionuclides and the calculation of public exposure are based on methodology recommended in the German incident guideline [1] which is in line with the European [2] and international normative documents [3]. This methodology has been successively used for assessment of potential accident consequences for the INPP Unit 2 safety justification for the final shutdown and defueling phase and other INPP radioactive waste treatment and storage facilities. The dispersion modelling and dose calculation methodology [1] is described and recommended by

the IAEA publications [4, 5].

[1] Incident Calculation Bases for the Guidelines Issued by the Federal Minister of the Interior (BMI) for the Assessment of the design of PWR Nuclear Power Plants pursuant to Sec. 28, para. (3) of the Radiological Protection Ordinance (StrlSchV), Bonn, Germany, 1983, Revision 2003 (in German);

[2] Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom;

[3] Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards General Safety Requirements. IAEA Safety Standards Series No. GSR Part 3, 2014;

[4] Methodology for Safety Assessment Applied to Predisposal Waste Management. IAEA-TECDOC No. 1777. IAEA, Vienna, 2015;

[5] Generic Models for Use in Assessing the Impact of Discharges of Radioactive Substances to the Environment. Safety Reports Series No. 19. IAEA, Vienna, 2001.

5. Before the shutdown of the reactor of Unit 2 (2004 - 2009) the activity of airborne releases was within the range of $3.12\text{E}+13$ Bq/year – $1.03\text{E}+14$ Bq/year.

After the shutdown of the reactor of Unit 2 (2010 - 2020) the average annual activity of airborne releases is $6.7\text{E}+09$ Bq (with the maximum activity of $1.95\text{E}+12$ Bq in year 2010), whereas the average annual activity of waterborne releases is $3.98\text{E}+10$ Bq (no significant deviations from the average annual value).

The annual effective dose of the representative conditioned by the airborne and water borne releases in 2018 increased if compared to the values of year 2017, whereas the activity of releases remained at the level of average annual dose for the period of 2010-2017.

Such increase of exposure dose values due to potential radionuclide impact was due to application of new dose factors. Elaboration of new dose factors was performed on the basis of the Nuclear Safety requirements BSR-1.9.1-2017 “Standards of Release of Radionuclide from Nuclear Installations and Requirements for the Plan on Release of Radionuclides”. Dose factors were calculated in compliance with the IAEA methodological manual “Generic models for use in assessing the impact of discharges of radioactive substances to the environment”, Safety Reports Series No 19, Vienna, IAEA, 2001.

All potential exposure pathways of the representative were considered in calculating the dose factors; conservative values of the initial parameters were applied.

Application of the new dose factors required the revision (reduction) of the permissible to be released from the INPP limiting annual (monthly, daily) activities. Find below the data on exposure doses to the representative due to airborne and water borne releases from the INPP for the period of 2018-2020.

Table 1. Exposure doses to the representative due to airborne and water borne releases from the INPP for the period of 2018-2020

Year	Annual dose due to airborne releases from the INPP, Sv	Annual dose due to waterborne releases from the INPP, Sv	Total (annual) dose due to releases into the environment, Sv
2018	2.17E-06	1.23E-06	3.40E-06
2019	3.48E-06	4.00E-07	3.88E-06

Year	Annual dose due to airborne releases from the INPP, Sv	Annual dose due to waterborne releases from the INPP, Sv	Total (annual) dose due to releases into the environment, Sv
2020	1.79E-06	3.15E-07	2.11E-06

6. It should be stated that preparation of all the INPP strategic, design, operation, maintenance, decommissioning, etc. documents in the field of nuclear energy is carried out in compliance with the requirements of the documents of the Republic of Lithuania regulating activity in the field of nuclear energy, the IAEA nuclear safety principles and recommendations, EU requirements and the good practices of other countries.

Planning of the INPP decommissioning started with the preparation of the INPP Preliminary Decommissioning Plan (1998–1999). Later, the IAEA expert mission was organized in order to obtain an authoritative opinion regarding the selected decommissioning strategy and the report “Selection of the Decommissioning Strategy for the INPP”, TCR-00368, was submitted in 2011. The report was based on the INPP PDP. The report concluded that the immediate decommissioning strategy is the best decommissioning option for the INPP. Thus, following the resolution of the Government of the Republic of Lithuania the Preliminary Decommissioning Plan was updated and the Final Decommissioning Plan was approved in 2002. Subject to the national legislation the FDP is updated every 5 years. The Final Ignalina Nuclear Power Plant Decommissioning Plan is the definitive and fully inclusive reference document covering the entire INPP decommissioning period.

Based on the adopted immediate dismantling strategy the INPP systems and equipment dismantling sequence follows “a building after building” approach and is associated with isolation and modification of the to be dismantled systems that are no longer needed for safety assurance or to ensure operation of other systems remaining in operation. During the preparatory activities for equipment dismantling preparatory works in buildings, rooms and premises are performed for ensuring:

- waste transportation conditions and routes;
- sites for dismantled equipment preliminary decontamination, fragmentation;
- temporary waste storage and packaging sites for different classes of waste;

preparation of building systems for performance of D&D works, including preparation of equipment for dismantling (taking down pipe insulation, arrangement of working areas, fencing), modification of utility systems (ventilation, power, water, compressed air supply, lighting), implementation of fire protection technical means, lifting devices, temporary sanitary locks, dose rate metering devices.

7. Graded approach is applied in the development and application of the Integrated Management System. But the safety is given the highest priority. Graded approach on the Integrated Management System requirements ensures the allocation and control of the necessary resources, taking into account:

- the importance of the safety and complexity of the enterprise. The functioning of the installation or performance of its activities;
- risks and the significance of potential impacts/risks related to the safety, Health. Environmental protection, Physical protection, Quality and economic;
- the possible consequences from the safety point of view in the event of a failure or an unexpected event. Or in the event of inadequate planning or incorrect implementation of the activities.

For example, activities on decommissioning projects, related to decontamination and dismantling

are planned to be performed first of all by preparing and assuring the proper working conditions in accordance with radiation protection and with recommendations of ALARA evaluation.

8. Development and Maintenance of a strong safety culture at Ignalina NPP is organized in accordance with the attributes of strong safety culture (see IAEA Safety guide, GS-G-3.5. Appendix I) and built upon:

- clear declaration of safety, security and quality policies by the top managers and adherence of those at all levels of organization;
- education of plant personnel to adhere the Principles of a strong Safety Culture;
- induction of contractors and subcontractors on importance to assure a safety and security at the Plant;
- periodical evaluation of Safety Culture and Security Culture;
- performance of annual self-assessment of activities;
- proper evaluation of operational experience.

Safety Culture Management Procedure and procedures for evaluation of safety culture and security culture are in place at the INPP.

9. Based on the regulator's inspections annual plan on average the regulator annually conducts approximately 50 inspections at the INPP in the field of:

- Compliance of undertaken activity with the legal acts and nuclear safety normative technical documents;
- Preparation for and performance of equipment dismantling and decontamination;
- Spent nuclear fuel, damaged fuel handling and storage, operation of storage facility;
- Implementation of radiation and physical security requirements during storage of disused sealed radioactive sources;
- Personnel exposure accounting system;
- Use of operational experience and implementation of regulatory requirements during implementation of modifications;
- Assurance of the physical security;
- Nuclear materials inventory inspection, implementation of IAEA and EURATOM safeguards;
- Implementation of fire safety requirements applicable to the systems important to safety;
- Control of maintenance of emergency power supply and back-up diesel generators, including ventilation, fire protection, drainage, measurement systems;
- Control of maintenance of structures important to safety;
- Control of solid radioactive waste handling and storage system;
- Control of emergency preparedness and design and beyond design basis accidents management procedures;
- Accounting, control and use of dual purpose goods;
- Control of radionuclide release to the environment, radiological monitoring systems;
- Aging management of structures, systems and components important to safety and data processing;
- management system and documents of an economic entity;
- economic entity's staff competences and training;
- safety improvements of activities;
- Control of suppliers of services, goods and works for the holders of and applicants for licenses and permits, etc.

For safety culture evaluation, INPP uses questionnaires (every three years), safety culture indicators (quarterly) and self-assessment of activities (once per year). Safety culture evaluation reports are submitted to the VATESI and managers of INPP departments.

Safety culture indicators at Ignalina NPP were determined by using attributes of the strong safety

culture (see IAEA Safety guide, GS-G-3.5. Appendix I) and by analysis of indicators and data of the IMS processes.

Ignalina NPP has established and implemented Integrated Management System aligned with the safety goals and corresponding to the requirements of the standards ISO 9001:2015 in the field of decommissioning of a nuclear facility, radioactive waste management, project management and expert services in the field of nuclear energy.

Every activity or decision which could have harmful impact of radiation to personnel or to environment due to human or organizational factor, in accordance with the graded approach before its implementation it is independently assessed and agreed with the regulatory body.

10. Find below the flow chart describing the steps of handling of the damaged fuel at the INPP Units. The information related to the safe handling of the damaged spent nuclear fuel is presented in the report „Addendum to the Final Safety Analysis Report of the ISFSF of the Project B1 (Handling of the Damaged Fuel)“. This Addendum to the FSAR contains the assessment and analysis of the following aspects:

- Safety assessment of the new technological processes and the equipment related to treatment, handling and loading of the damaged fuel into storage casks, as well as collection and storage of fuel pellets/debris;
- Safety assessment of the modifications of the spent fuel storage pools hall required for installation of the Damaged Fuel Handling System (DFHS) equipment
- Safety assessment of the storage cask CONSTOR®RBMK1500/M2 loaded with cartridges with the damaged fuel assemblies;
- Safety assessment of the repacking process of the cask filled with cartridges with the damaged fuel at the Fuel Inspection Hot Cell (FIHC).

This report was agreed by the VATESI after confirmation of safety criteria set by the basic design, SAR and the Interim Spent Nuclear Fuel Storage Facility Operation Technical Specification during the “Hot” trials of the DFHS.

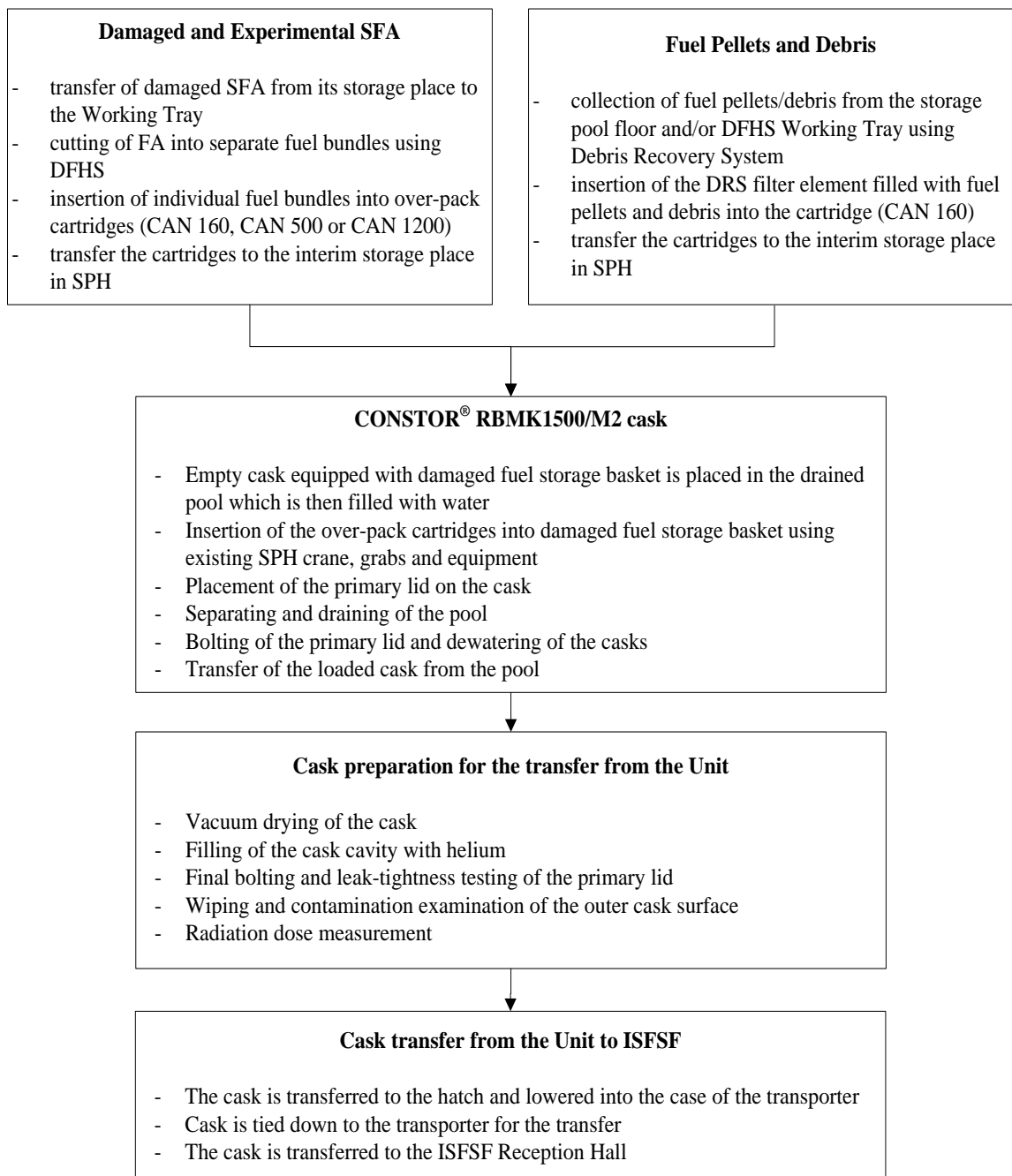


Fig. 1 The main operations for handling of the damaged SNF at the Unit

Consequently, safety of activities related to handling the damaged fuel was assessed in the corresponding project (see information provided under comment 1). In compliance with the Final Decommissioning Plan handling of the damaged fuel were planned to be started after removal for storage of all leaktight fuel. Till that moment damaged SFAs were stored in the manner and places prescribed by the design, i.e. in special cartridges and places serving as additional physical barrier for potential radionuclide spreading in case of design and potential beyond design basis accidents. Currently, damaged SEAs still remain only at Unit 2 to be transported to the ISFSF (see information provided under comment 1).

Stress tests of the spent fuel storage pools containing spent nuclear fuel were conducted in 2011 under conditions more unfavourable from the point of view of potential consequences in case of earthquake, flooding and full loss of power supply on the INPP site. For the purpose of evaluation it was assumed that the spent fuel pools are fully loaded with the spent nuclear fuel and it was justified that there was sufficient time for recovery of potentially lost safety functions that ensure integrity and safety of the SFAs. Procedures for management of the beyond design basis accidents

at the spent fuel storage pools and the strategies envisaged herein, depending on the consequences, are sufficient and do not have deficiencies. Following the stress tests the modification related to installation of additional temperature and water level measurement in the spent fuel storage pools was implemented.

11. Ignalina NPP implements the decommissioning strategy by the method of "immediate dismantling", performing necessary technical, organizational measures and resources mobilization. In this context, the deep geological repository development will be an ultimate destination of all radioactive long-lived waste, including retrieved graphite.

INPP performs the necessary characterization, gaining access, graphite removal, handling and sorting of retrieved graphite and other materials, packaging and transferring of packaged graphite (without mixing with other materials) in a special infrastructure - licensed interim storage facilities for 50 years (without treatment):

- The existing operational waste of graphite will be stored in the Solid waste storage facility B4 for which transboundary environmental impact assessment has been carried out pursuant to the Convention on Environmental Impact Assessment in a Transboundary Context of the United Nations Economic Commission for Europe (Espoo, 1991).
- Reactor channel's graphite rings/sleeves will be stored in the existing storage facility (to be transferred to RWISF facility).
- Reactor graphite blocks and rods. For this waste there are some alternatives of interim storage, for example, to build an extension of the ILW-LL storage facility; to build a new reactor waste storage facility (RWISF); to store in the existing waste storage facility, etc. Decision about irradiated graphite stack interim storage will be made in the near future (during the designing and licensing of the reactor dismantling).
- Graphite from the dismantled reactors will be moved to the interim storage facilities in 2022 – 2038. The waste will be stored awaiting deep geological repository's commissioning and will be disposed of in a geological repository.

The works for deep geological repository are underway <https://www.iaea.lt/en/activity/decommissioning-projects/deep-geological-repository/424>.

Once the disposal criteria will be clarified, adequate processing/treatment methods will be implemented for accumulated and sorted graphite waste.

To apply and improve own experience and international achievements, the specialists of the Republic of Lithuania had participated in modern projects, such as EU CARBOWASTE Treatment and Disposal of Irradiated Graphite and Other Carbonaceous Waste, IAEA Project on processing of Irradiated Graphite to Meet Acceptance Criteria for Waste Disposal and IAEA International Project on Irradiated Graphite Processing Approaches (GRAPA), etc. Additional progress is expected in new IAEA projects on challenges and options for the disposal of irradiated graphite, addressing irradiated graphite in decommissioning projects for 2021-2023 period. Schematic diagram of nodes of RBMK-1500 core dismantling is given in Picture 1.

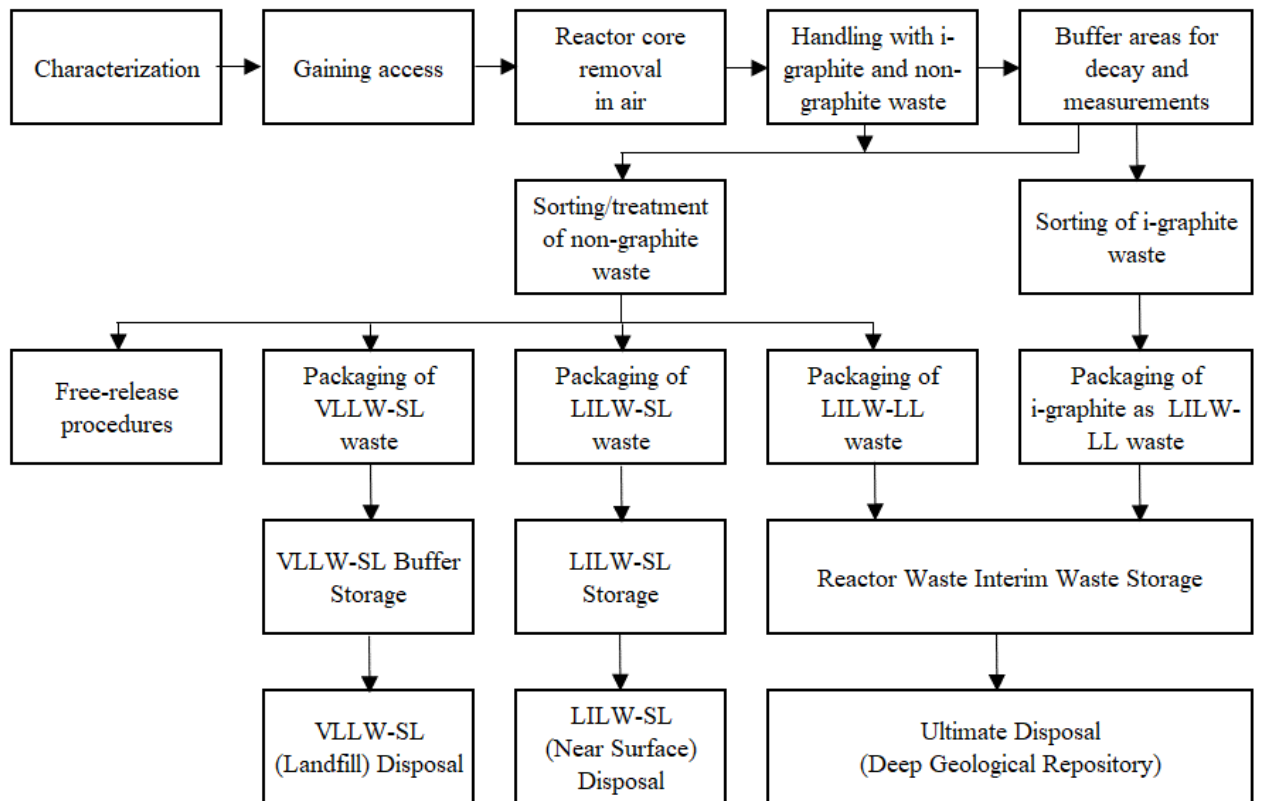


Fig. 1 (courtesy of Ignalina NPP, IAEA GRAPA project)

By 2021 the safety justification process of the channel's graphite removal, handling, measurement, sorting, packaging was completed for Unit 1 R1, R2 dismantling project. Considering the similar design and operational features we are going to apply Unit 1 experience for safety justification regarding Unit 2 R1, R2 dismantling project. Moreover, Ignalina NPP will re-use the documented maintenance experience of RBMK channels changing in the past operation. The safety justification of the existing storage facility (building 158/2) for RBMK-1500 Channel Graphite Waste Temporary Storage (for both Units) was prepared and in 2018. This justification presents the analysis and results of safety assessment and justification for the existing storage facility, which is intended to be used for the temporary storage of graphite waste (segments of graphite rings and sleeves from the reactor channels; class D waste), arising during dismantling of the technological and control and protection system channels in the R1 areas of the State Enterprise Ignalina NPP reactors. Up to now, safety of the existing building was justified only for the temporary storage of Class B and C cement solidified radioactive waste. The main conclusion regarding performed safety assessment and justification of the proposed graphite waste temporary storage in the existing storage facility, are the following:

- No impact to site characteristics, human activity or infrastructure in the region of the site from proposed activity and vice versa is expected, compared to the present situation.
- Environment monitoring associated with operation is integrated into the existing INPP environment monitoring system and no additional measures are needed for the proposed graphite storage option. All organizational and technical measures of INPP facilities physical protection system are foreseen in physical security plans and additional security measures, if any, will be integrated in the existing INPP main site physical protection system.
- Existing operation and quality assurance, management system, emergency preparedness measures as well as ageing management procedures used at INPP are suitable and for the proposed graphite storage option; no additional measures for fire detection and firefighting

are required to be installed in the rooms/buildings where graphite waste management takes place, however, some recommendations are provided.

- Proposed activity generates -250 tones of irradiated graphite waste in total from both reactor units (-230 tones of graphite from technological channels and -20 tones of graphite from control and protection system channels); minor releases of radionuclides could be expected during normal operation conditions; accumulation of Wigner energy could be expected only for graphite waste from control and protection system channels.
- Radiological WACs for graphite waste are covered by WACs (waste acceptance criteria) of cement solidified waste, whereas some specific non-radiological WACs are established for graphite waste, differing from cement solidified waste; existing cement solidified waste drum measuring unit is suitable for characterization of drum with graphite waste only after modification.
- Considering the storage of graphite waste, safety classification of existing systems, structures and components was checked, and it revealed that it is appropriate. New equipment, developed especially for graphite waste, was also classified from the point of view of safety. Use of existing systems like F-ANP container management system, ventilation and filtration system, radiological monitoring system, fire protection system, etc. was justified as well.
- Drops of waste packages and fires during on site transportation were identified as bounding cases, respectively, for workers and population. The evaluation of radiation doses to workers and population revealed that no exposure exceeding allowable limits to public, and workers is expected during both, normal operation, and accidental conditions.
- All the foreseen activities are performed in line with the national and international safety and radiation protection standards and recommendations.

Therefore, prepared and approved by authority's documentation demonstrates that the existing storage facility is suitable and for graphite waste temporary storage, i.e. it can be operated and decommissioned in full compliance with the national and international safety criteria and design requirements defined in Lithuanian legislation, regulations and standards, IAEA recommendations and technical specifications.

12. Deep geological repository is an ultimate destination of all radioactive long-lived waste, including retrieved graphite. It is consistent with the IAEA recommendations.

13. In the introductory part of the presentation the information on all the INPP decommissioning projects carried out by the INPP is presented in order to give the general view of the entire decommissioning process. The information related to the planned economic activity (project 2102), for which the present transboundary assessment is performed is briefly presented on pages 22-26 of the presentation (Unit 2 reactor R1 and R2 zones equipment dismantling). On pg. 10 of the presentation under the notion high level waste (HL) it is assumed solid radioactive waste of class III based on the radioactive waste classification that was used at the INPP during the operation and technical maintenance period. Solid radioactive waste of class III were temporarily stored in the existing waste storage facilities (SRW storage facilities). Currently the project dedicated for retrieval of such waste (ProjectB2), for processing (Project B3) are under implementation, thus this class of waste is indicated on the diagram on pg. 10. Find the information on the transboundary assessment of the projects B-2 andB-3 on pg. 17 of the presentation.

On pg. 4 of the Non-Technical Summary it is stated:

“In the process of performing of D&D works of the equipment from working areas R1 and R2, radioactive waste of classes A, B, C, D, E will be generated. The classification of radioactive waste is established by the Nuclear Safety Requirements BSR-3.1.2-2017 “Pre-disposal Management of Radioactive Waste at Nuclear Installations”. In accordance with this document, classes A, B and C include short-lived very low-level, low-level and intermediate-level radioactive waste, and classes D and E are long-lived low-level and intermediate-level radioactive waste.” This waste is indicated as VLLW and L&IL SRW in the presentation on pg. 10.

14. The data presented in the presentation is in line with the radiological impact assessment results, specifically in relation to the maximum annual effective dose (year 2024) for the representative of the public group presented in the Non-Technical Summary.

It is stated on pg. 14 of the Non-Technical Summary:

The maximum estimated annual dose of the representative due to the proposed economic activity impact for the year 2024 will be equal to $7.47\text{E-}06$ mSv, that will amount to $4.61\text{E-}02$ % of the total annual effective dose to the representative due to radioactive exposure (airborne and waterborne discharges) on the environment from existing NFs on the INPP site – 0.0162mSv in the year 2024.

In Table 1 on pg. 16 the total dose for the representative in year 2024– $1.62\text{E-}02$ mSv is indicated too.