Progress in Nuclear Energy 73 (2014) 129–139

Contents lists available at ScienceDirect

Progress in Nuclear Energy

journal homepage: www.elsevier.com/locate/pnucene

The environmental impact assessment process for nuclear facilities: A review of the Lithuanian practice and experience

V. Ragaišis*, P. Poškas [1], V. Šimonis [2], A. Šmaižys [3], R. Kilda [4], D. Grigaliūnienė [4]

Lithuanian Energy Institute, Nuclear Engineering Laboratory, 3 Breslaujos Str., LT-44403 Kaunas, Lithuania

ARTICLE INFO

Article history:
Received 23 July 2013
Received in revised form
13 December 2013
Accepted 23 January 2014

Keywords:
Lithuania
Nuclear facilities
Environmental impact assessment
Regulatory review

ABSTRACT

The only one nuclear power plant (NPP) in the Republic of Lithuania – Ignalina NPP has been shutdown and entered the phase of decommissioning. Decommissioning activities, along with dismantling works, include construction and operation of a new spent nuclear fuel and radioactive waste management, storage and disposal facilities. The new NPP in Lithuania, if such would be constructed, are to be located adjacently to the existing plant. Current and future planned nuclear activities in Lithuania are concentrated in a single location, in the northeast of the country near the state borders with the Republic of Latvia and the Republic of Belarus. Number of different projects and participants involved, necessity to control and limit overall impact on the environment require for planning and coordination of activities and impacts, including consideration and updating of outcomes from the previous environmental impact assessment (EIA) studies. Regulatory review and coordination of EIA documents also demands substantial time resources, impacts schedule of activities and therefore must be properly planned and managed. The paper describes approach and progress in EIA for nuclear activities in Lithuania and examines experience gained in preparation, review and coordination of EIA studies. Emphasis is placed on approach that has been used to deal with cumulative radiological impact because acceptability of this impact is one of primary goal in demonstration of acceptability of the newly planned nuclear activities.

1. Introduction

Current and future planned nuclear activities in the Republic of Lithuania are concentrated in a single location[5] at the northeast of the country, close to the state borders with the Republic of Latvia and the Republic of Belarus. The Ignalina nuclear power plant (INPP) is situated on the southern bank of Lake Drūkšiai. It contains two RBMK-1500 water-cooled graphite-moderated channel-type power reactors. Following the country accepted obligations for the European Union (EU) and the National Energy Strategy (Parliament, 2002), the first reactor was shutdown on 31 December 2004, after 21 years of operation. The second reactor was shutdown on 31 December 2009, after 23 years of operation. The Government of Lithuania approved decision to implement immediate dismantling strategy for decommissioning of the INPP Unit 1 (Government, 2002). The same dismantling strategy is applied for decommissioning of the INPP Unit 2 and the remaining plant installations. The INPP decommissioning planning foresees reaching of "brown field" conditions by 2030 (INPP DPMU, 2004a).

Implementation of the decommissioning requires construction of new nuclear facilities for management of spent nuclear fuel (SNF) and radioactive waste (Poskas et al., 2012). The current revision of the National Energy Strategy (Parliament, 2012), foresees construction of a new regional nuclear power plant. The plant will be located nearby the INPP.

In accordance with requirements of national legislation and assumed international obligations, all these nuclear activities have to pass the environmental impact assessment (EIA) procedure prior authorization for implementation of activity could be granted.

2. Current and planned nuclear activities in Lithuania

The INPP is the only one nuclear plant in the Republic of Lithuania. It has build as part of the former Soviet Union's North-

* Corresponding author. Tel.: +370 37 401889; fax: +370 37 351271.
E-mail addresses: valdas@mail.lei.lt (V. Ragaišis), poskas@mail.lei.lt (P. Poškas), simonis@mail.lei.lt (V. Šimonis), smaizys@mail.lei.lt (A. Šmaižys), raimond@mail.lei.lt (R. Kilda), dalyte@mail.lei.lt (D. Grigaliūnienė).
[1] Tel.: +370 37 401 891; fax: +370 37 351 271.
[2] Tel.: +370 37 401 888; fax: +370 37 351 271.
[3] Tel.: +370 37 401 890; fax: +370 37 351 271.
[4] Tel.: +370 37 401 992; fax: +370 37 351 271.
[5] Exception is a small storage facility for institutional waste in the Maišiagala site, about 30 km northwest from Vilnius, capital of Lithuania. This stand-alone facility is closed and, according to the current approach, poses no danger as long as it is adequately supervised. The state enterprise Radioactive Waste Management Agency (RATA) has granted a license for surveillance of the facility in 2006. No EIA process has been initiated or is planned for this facility in the nearest future.

0149-1970/$ – see front matter © 2014 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.pnucene.2014.01.014

West unified power supply system. Lake Drūkšiai, being the biggest lake in Lithuania, was selected as a natural source of the plant cooling water supply. The first power unit went into service at the end of 1983, the second power unit – in 1987. The design lifetime was projected out to 2010–2015. A total of four units were originally planned on the site, however construction of the third unit was terminated because of political pressure.

After collapse of the Soviet Union in 1991, the Republics of Lithuania, Latvia and Belarus become independent states with a nuclear power plant located close to the junction of new state borders. The state border between Republics of Lithuania and Belarus stretches over the plant cooling pond – Lake Drūkšiai. The state border between Republics of Lithuania and Latvia passes just in few more kilometers away. Outflow from Lake Drūkšiai, begins with river Prorva in the territory of the Republic of Belarus and via approximately 570 km long rivers continuum reaches Gulf of Riga (Baltic Sea) in the territory of the Republic of Latvia. The region around the INPP is agricultural with a lot of lakes and forests. Population density in the region is below the country's average. Nearest big cities to the plant are Vilnius (the capital of Lithuania) at a distance of 130 km with over 500 000 inhabitants and Daugavpils in Latvia, 30 km away with over 100 000 inhabitants. Six kilometers from the plant is the city of Visaginas – residence of the INPP personnel with over 20 000 inhabitants.

Nuclear activities requiring performance of EIA are concentrated in a relatively small area of approximately 4 × 2 km (Fig. 1). The area is inside the 3 km radius sanitary protection zone of the INPP. There are no permanent inhabitants in this zone and other, nuclear industry not related economic activities are limited by administrative means.

Nuclear activities can be grouped depending on their nature, location and implementation status. Table 1 provides summary of current and future planned nuclear activities which require performance of EIA. Specific of separate projects is detailed below.

2.1. Storage and management of spent nuclear fuel and radioactive waste

The INPP decommissioning preparation activities requires implementation of several large-scale projects for the management of SNF and radioactive waste.

The current SNF management concept in Lithuania foresees dry storage of SNF for at least 50 years (Government, 2008). During this time the final concept for SNF management must be developed. Dry storage technology at the INPP was introduced in 1992 with construction of SNF storage facility where SNF is stored in casks of CASTOR® RBMK-1500 and CONSTOR® RBMK-1500 types. Capacity of the existing facility is not sufficient for storage of all SNF from the INPP. A new interim spent nuclear fuel storage facility (ISFSF) is under construction for storage of remaining SNF. The ISFSF is being constructed to the south from the INPP (Fig. 1, item 3). SNF will be stored in casks of CONSTOR® RBMK-1500/M2 type.

Since beginning of the INPP operation, all the power plant generated solid radioactive waste is stored in the storage buildings

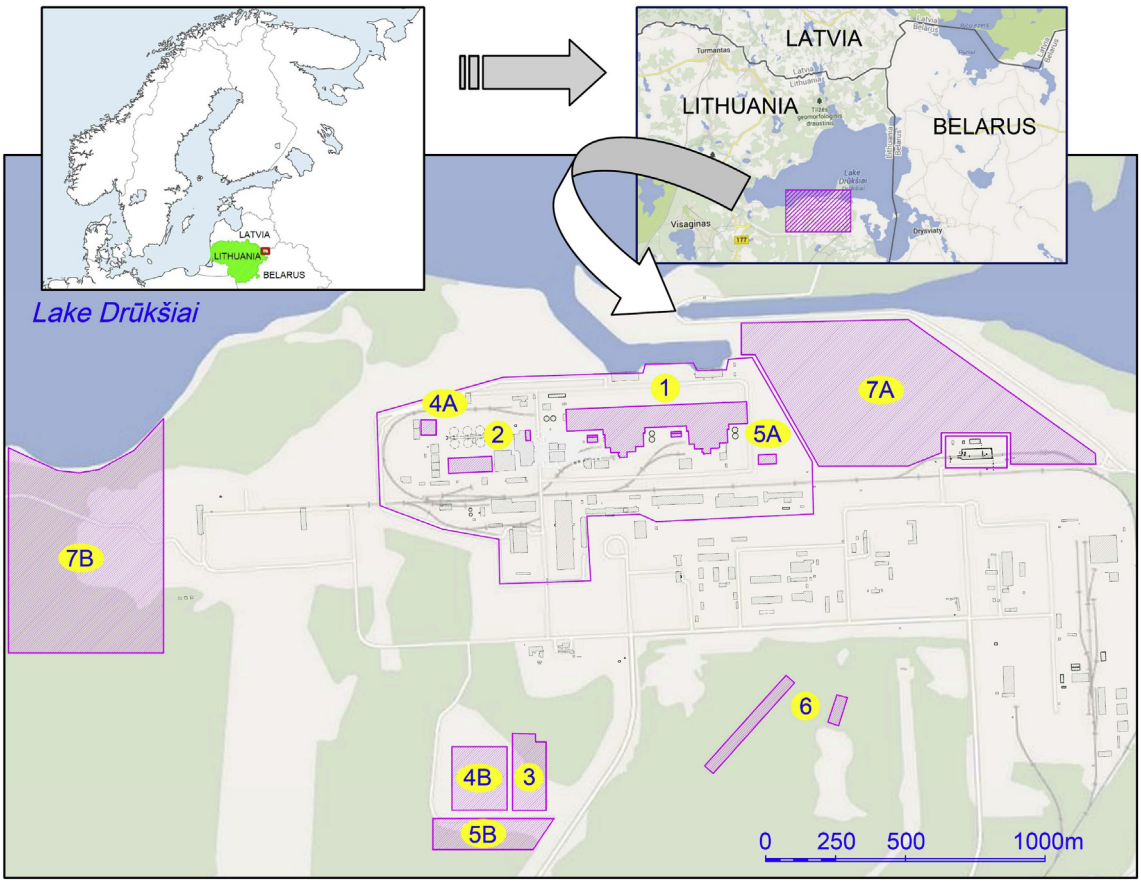

Fig. 1. Layout of the current and future planned nuclear activities, which require performance of EIA: 1 – power units 1 and 2 of the INPP; 2 – cement solidification facility and interim storage building of cemented radioactive waste; 3 – new spent nuclear fuel storage facility; 4A, 4B – solid radioactive waste retrieval (4A) and treatment and storage (4B) facilities; 5A, 5B – buffer store (5A) and disposal units (5B) of very low level radioactive waste disposal facility; 6 – disposal units of short-lived low and intermediate level radioactive waste disposal facility; 7A, 7B – alternative locations for the new VNPP.