



**INTERNATIONAL  
ANKARA CONGRESS ON  
SCIENTIFIC RESEARCH VI**

**April 1-3, 2022  
Ankara - TURKEY**

**THE PROCEEDINGS BOOK**

**EDITOR:  
Prof. Dr. Müslüme NARİN**

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*Ankara*



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SCIENTIFIC RESEARCH VI

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April 1-3, 2022/ Ankara - TURKEY

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## THE EARTHQUAKE LOADS INFLUENCE ON STORAGE RESERVOIRS FOR ENVIRONMENTALLY HAZARDOUS LIQUIDS

**Elena Sierikova**

National University of Civil Defence of Ukraine

ORCID: 0000-0003-0354-9720

**Elena Strelnikova**

A.M. Podgorny Institute for Mechanical Engineering Problems NAS of Ukraine

ORCID: 0000-0003-0707-7214

**Vasil Gnitko**

A.M. Podgorny Institute for Mechanical Engineering Problems NAS of Ukraine

ORCID: 0000-0003-2475-5486

### ABSTRACT

In case of tank accidents, oil products spill and pollute the surrounding areas and water basins<sup>1</sup>. The ingress of toxic and flammable liquids from the tanks for their storage into the environment and their further spread to the territory of settlements could cause mass people and animals poisoning, and lead to environment pollution<sup>2</sup>. Liquid spills could lead to explosions and fires that could spread to nearby reservoirs and surrounding areas. As the tanks store the huge supply of combustible substances, the fire could have serious consequences. Economic losses from oil leakage and fire accidents include not only direct losses, but also the cost of environmental restoration measures, as well as the cost of replenishing the stock of petroleum products<sup>3</sup>.

To increase the environmental safety level of the areas adjacent to the reservoirs for environmentally hazardous liquids (EHL) storage it has been proposed to control the effects of natural and technogenic factors on reservoirs for EHL taking into account models of seismic loads and fluctuations in reservoirs for EHL (Fig. 1).

For satisfactory operation of such algorithm, it has been proposed to consider the area of the reservoir as potentially contaminated if the forecasts for the reservoir parameters do not correspond to the calculations during the entire service life. We consider it is important and mandatory to take into account data and forecasts of seismic changes in the reservoirs for EHL location, the conditions of reservoirs, technogenic and natural impacts on reservoirs and conditions of conservation of EHL in the necessary measures to ensure the integrity of the reservoir and minimize its impact on the environment<sup>4</sup>.

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<sup>1</sup> Strelnikova E., Gnitko V., Krutchenko D., Naumemko Y. Free and forced vibrations of liquid storage tanks with baffles. *J. Modern Technology & Engineering*. 2018. Vol. 3. No.1. P.15–52.

<sup>2</sup> Sierikova E. Strelnikova E. Gnitko V. Kryutchenko D. Reservoirs seismic resistance. *Proceedings book of 6th International Congress on Innovative Scientific Approaches*. December 19-20, 2021, Samsun, Turkey. IKSAD GLOBAL Publishing House. 2021. P. 264-267.

<sup>3</sup> Sierikova E., Strelnikova E., Kryutchenko D. Seismic loads estimation on the storage tanks for toxic and flammable liquids. *Bulletin of V.N. Karazin Kharkiv National University series «Mathematical modeling. Information technology. Automated control systems»* issue 51, 2021. P. 70–80. <https://doi.org/10.26565/2304-6201-2021-51>

<sup>4</sup> Sierikova O.M. Strelnikova O.O. Gnitko V.I. Tonkonozhenko A.M. Pishnia L.A.. Neutralization of static electricity in oil storage systems through application of nanocomposites with carbon fiber inclusions. *Applied questions of mathematical modeling* Vol. 4, No. 2.2. Kherson. 2021. P. 159–168. <https://doi.org/10.32782/KNTU2618-0340/2021.4.2.2.16>

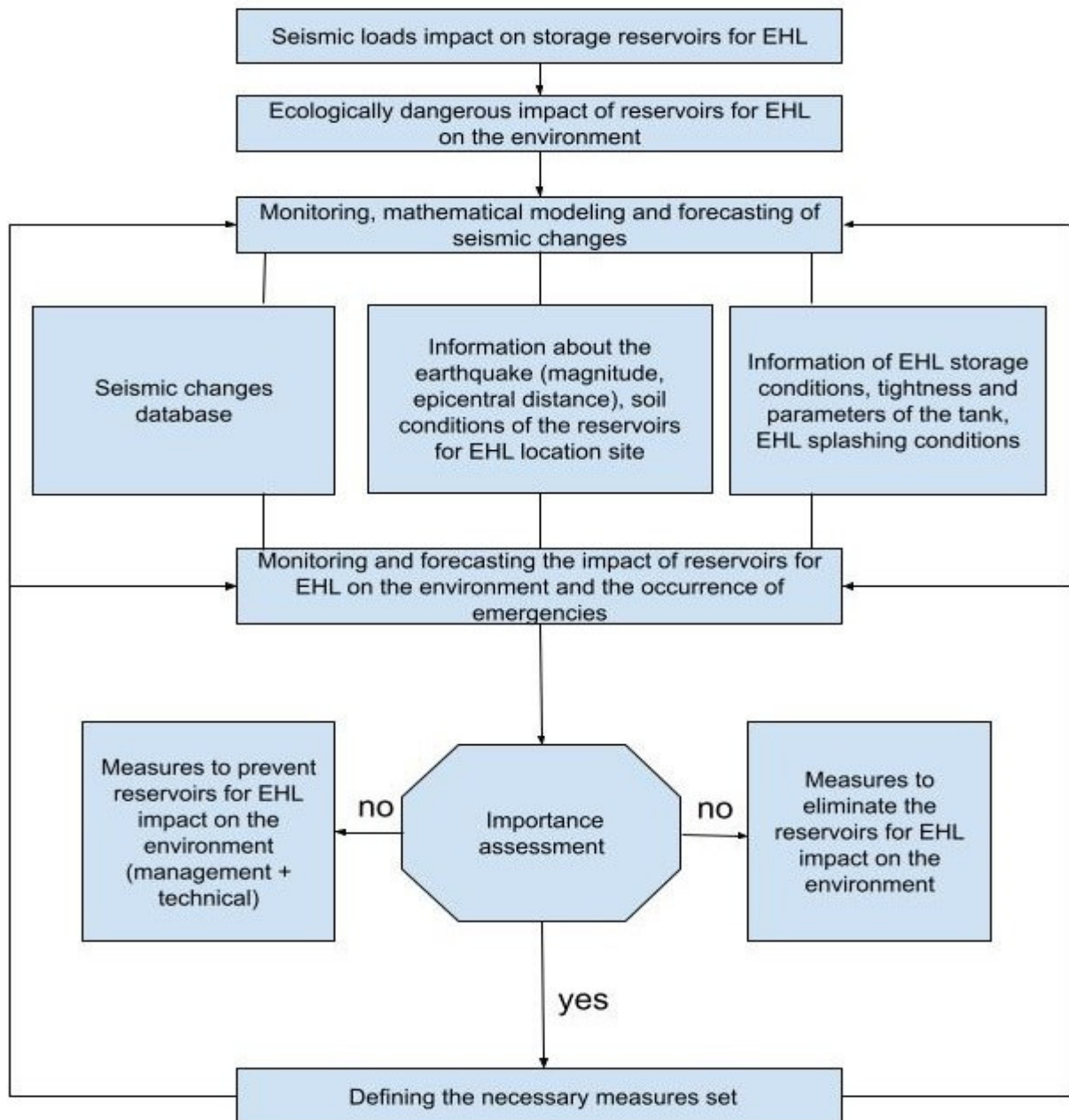


Fig. 1 – Algorithm of actions during monitoring of seismic loads on storage reservoirs for environmentally hazardous liquids<sup>56</sup>.

**Keywords:** environmental safety, seismic loads, environmentally hazardous liquids

<sup>5</sup> Sierikova E., Strelnikova E., Pisia L. The Environmental Safety Level Increasing of Oil Storage Systems. Proc. of International Afghanistan Interdisciplinary Research Conference. Taj Institute of Higher Education Mazar-i-Sharif, Afghanistan. August 19, 2021. P. 286-288.

<sup>6</sup> Sierikova O., Strelnikova E., Gnitko V., Tonkonozhenko A., Pisia L. Nanocomposites Implementation for Oil Storage Systems Electrostatic Protection. Conf. Proc. of Integrated Computer Technologies in Mechanical Engineering – ICTM-2021. Synergetic Engineering Springer Nature Switzerland AG 2022 M. Nechyporuk et al. (Eds.): ICTM 2021, LNNS Vol. 367. P. 573–585. [https://doi.org/10.1007/978-3-030-94259-5\\_49](https://doi.org/10.1007/978-3-030-94259-5_49)