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US experts: significant water contamination in Japan

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JAPAN/RADIATION-WATER

* Significant contamination of surface water, sea water seen

* Ocean dilution mitigates risk to marine organisms

* Exact health impact hard to assess without more data

By Deborah Zabarenko, Environment Correspondent

WASHINGTON, March 28 (Reuters) - Groundwater, reservoirs and sea water around Japan's earthquake damaged nuclear plant face "significant contamination" from the high levels of radiation leaking from the plant, a worrying development that heightens potential health risks in the region.

Nuclear and environmental scientists in the United States darkened their assessment of the risks markedly on Monday after operators at the Fukushima Daiichi power plant said that highly radioactive water has entered underground concrete tunnels extending beyond the reactor.

Sea water and fresh water used to cool the reactors, critically damaged by Japan's March 11 earthquake and tsunami, and spent fuel pools at the plant have been put in storage tanks there. But reports indicate these tanks are full or over-flowing with tainted water, experts said.

"It's just hard to see how this won't result in significant contamination of, certainly, sea water," said Edwin Lyman, a physicist and expert on nuclear plant design at the U.S.-based Union of Concerned Scientists.

"There will be dilution, some of that will be reconcentrated, but I don't think this can be sugar-coated at this point."

The experts said they need more information from Japanese authorities before accurately assessing the exact environmental and health impact. They did not say whether the latest developments can explain low levels of radiation in Tokyo's water supply.

But their remarks were gloomier than a few days earlier when scientists said the vast ocean would dilute radiation and it did not appear to pose a health risk.

Surface and sea water used to cool the damaged plant is tainted with radiation and could contaminate the adjacent ocean, surface reservoirs and groundwater, Lyman said. In addition, water is leaking inside various parts of different reactors and beyond, posing a threat.

"There's already been an enormous amount of radioactivity released from this plant into the air, and that will deposit on sea water and surface water supplies," said Lyman in a telephone briefing on Monday. "It's hard to imagine that there won't be some significant contamination that will have to be dealt with."

Reports that plant workers were exposed to radiation 100,000 times normal in water inside reactor No. 2 at the weekend could suggest a breach in some parts of the reactor buildings, where tainted water is pooling and getting into tunnels.

"Pathways for that (radioactive) material to get out are numerous," said David Lochbaum, a nuclear engineer and director of the union's Nuclear Safety Project.

Lochbaum noted that the reactor buildings for units 1, 3 and 4 at the Fukushima plant are no longer intact and therefore not acting as barriers to nuclear contamination. This contaminated water "may leave as it evaporates from puddles on the floor," he said.

Contaminated water can also be discharged in liquid form, Lochbaum said.

BIG OCEAN

Sea contamination is a concern for the Japanese, who consume about 9 million tons of seafood a year, second behind China. The Kuroshio Current lies along Japan's east coast, where the $2 billion annual catch includes various kinds of tuna, mackerel, other flat fishes, squid and crabs, according to the Sea Around Us project, a collaboration of the Pew Environment Group and the University of British Columbia.

Radioactive material can get into water from steam or smoke which is carried by wind, rain or other precipitation onto land, surface reservoirs or the ocean. It could also be discharged directly into the ocean or leak onto land and eventually seep into groundwater.

Two materials are of concern -- cesium 137 and iodine 131.

Iodine 131, which can cause thyroid cancer, decays quickly, with a half-life of eight days, meaning its potency falls by a half in that time. The amount of this radioactive isotope of iodine is a tiny fraction of the amount of normal iodine in ocean water, said Timothy Kenna, an expert on the ocean and radiation at Columbia University's Lamont-Doherty Earth Observatory in New York.

Cesium 137, also a carcinogen, takes much longer. It has a half-life of 30 years. There are still traces of this radioactive isotope lingering from nuclear weapons tests in the Pacific in the 1950s and 1960s, Kenna said. So far, it has not been a threat to marine life, he said by telephone.

Both chemicals would likely stay in the upper 100 yards (meters) of the ocean if they were deposited on the surface by emissions from the Fukushima plant, he said. The ocean has an average depth of 4,000 yards, meaning it has a far large volume to allow for dilution compared with rivers or lakes.

Global nuclear weapons tests showed that marine wildlife tends to absorb less radioactive material than organisms in lakes or rivers, said F. Ward Whicker, an emeritus professor at Colorado State University and one of the founders of the field of radioecology, which addresses the affects of radioactivity on the environment.

Additionally, when there is plenty of potassium and calcium in the ocean, marine life will absorb those nutrients before taking in radioactive materials, lessening the danger of seafood contamination, experts said. (Additional reporting by Charles Abbott; Editing by Stella Dawson)
