

State Nuclear Safety Inspector Office

April 2009 Monthly Report to the Legislature

Introduction

As part of the Department of Health and Human Services' responsibility under Title 22, Maine Revised Statutes Annotated (MRSA) §666 (2), as enacted under Public Law, Chapter 539 in the second regular session of the 123rd Legislature, the foregoing is the tenth monthly report from the State Nuclear Safety Inspector under this new legislation.

The State Inspector's individual activities for the past month are highlighted under certain broad categories, as illustrated below. Since some activities are periodic and on-going, there may be some months when very little will be reported under that category. It is recommended for reviewers to examine previous reports to ensure connectivity with the information presented as it would be cumbersome to continuously repeat prior information in every report.

Since the footnotes are expanded definitions of some scientific terms, for simplicity they were placed in a glossary at the end of the report. In addition, to better understand some of the content of the topics, some effort was placed in providing some historical information. However, for the time being this historical context will be provided as an addendum to the report.

Independent Spent Fuel Storage Installation (ISFSI)

During April the general status of the ISFSI was normal. There were 4 instances of spurious alarms due to environmental conditions. All alarms were investigated and no further actions were warranted. There were no fire or security related impairments and no security events logged in April.

There were seven condition reports¹ (CRs) for the month of April. The first three CR's were written on April 6th with two of the three involving the national security firm ADT. ADT's purpose is to provide additional coverage to ensure that the Local Law Enforcement Agency is notified should Maine Yankee request that action. The reason for the first CR is that on this day ADT did not contact Maine Yankee for the proper acknowledgement. The second CR is an extension of the first in that ADT did not follow their protocols to contact Maine Yankee. The third CR of that day involved the administration of a security qualification list. An individual was added to the list prior to their completing all their requirements. The fourth and fifth CR's were written on April 21st. Both CR's had to do with a spill of about four ounces of diesel fuel oil. One CR was written for the spill, which had permeated through the preventative pad that was placed on the ground to capture any spillage. The other CR addressed the residual fuel dripping off the side of the truck onto a cement pad where the vehicle had been parked. On the former it was surmised that, since the ground was wet, it enhanced the permeability of the oil to be transmitted through the pad and into the dirt. The soil was cleaned-up immediately. The Department of Environment Protection was notified of the spill and was satisfied with the clean-up. An interim corrective action will be to double up on the absorbent pads or use a plastic barrier when wet conditions exist. A longer term solution was initiated on April 29th when a concrete pad was poured for the diesel fueling area. A sixth CR was written on April 23rd for the

¹ Refer to the Glossary on page 6

security transfer form SSTF 09-008. The form was not completely filled out by the on-shift supervisor. On April 29th a seventh CR was written on the ISFSI FP-6 Attachment M discovery. A fire extinguisher was found in service beyond its required hydro static test date. The extinguisher was promptly removed from service and replaced with an extinguisher that met all service requirements

Other ISFSI Related Activities

On April 8th, as part of its Environmental Covenant with the Department of Environmental Protection, Maine Yankee notified the Department that its Soil Management Plan was used three times over the past year. The first application was to support a sewer line tie in near the ISFSI support building. The second was to support the installation of a new fire hydrant approximately 50 feet from the ISFSI support building. The third situation was to support a domestic water line excavation to cut and cap a dead leg, which serviced the former plant buildings. Samples were taken for each excavation and no chemical contamination was found.

On April 12th a low battery alarm was identified on the ADT panel. A work order was issued to correct the problem. At about 1:00am on April 13th the alarm was cleared. Maine Yankee contacted ADT and they were no longer experiencing any alarms at their end.

On April 14th the oversight committee held its fourth quarterly meeting with various state agencies and Maine Yankee in attendance. The discussion centered on the present activities of all the involved parties. Other than the committee's activities highlighted in this report the group also discussed the Maine Yankee Citizens Advisory Panel meeting that will be held on the evening of June 25th at the Chewonki Foundation. We also continued our discussions related to the third party independent expert, how best to utilize this person, and the possibility of having this individual on retainer when a question arises.

On April 23rd a security camera was degraded for a very short time. However, it had no impact on the site's security plan.

On April 30th the U.S. Nuclear Regulatory Commission (NRC) forwarded a letter to Maine Yankee stating that they had reviewed their "proposed revision to the physical security plan, and determined that no physical security changes were made, and therefore the proposed changes would not decrease the effectiveness of the plan." Furthermore, Maine Yankee is required to submit a report to the NRC of the security changes within two months of their implementation.

Environmental

In late March the State experienced problems with the air sampling unit at the old Bailey Farm House in Wiscasset and was forced to shut it down. Since the control air sampler on the roof of the Health and Environmental Testing Laboratory in Augusta was experiencing similar problems as the Wiscasset air sampler, both air samplers were serviced and repaired at the State's Radiation Control Offices in Augusta by the Manager of the Radiation Program. Both units required cleaning and new parts. Both units were placed back in the field and operating on April 7th.

Maine Yankee Decommissioning

With only the East Access Road survey near the ISFSI scheduled for further evaluation this spring, one final confirmatory report remained to be completed. At present, there are ten confirmatory reports that are essentially complete with one remaining that is currently being drafted. More documentation was compiled in April and forwarded to the State's consultant for incorporation of that information into the final draft. The

final confirmatory report for the final site survey is expected to be completed in May. Due to the extensive write-up and delay in finalizing this last report, the decommissioning summary report is now expected to be completed in June.

Groundwater Monitoring Program

The review of Maine Yankee' third annual ground water report has been slow and steady over the last couple of months given the amount of information provided. At the end of April over three quarters of the information had been reviewed with the remainder to be completed in May with comments to follow.

As part of its annual quality assurance oversight of the groundwater monitoring program, the State received seven well samples for analysis from the March groundwater sampling. The water samples were analyzed by the State's Health and Environmental Testing Laboratory and the results received in April. Four of the seven wells had positive indications of Tritium², ranging from 124 to 34,700 pCi/L³. However, three of the four positive indications were less than 600 pCi/L. Any well sample that has a Tritium concentration of less than or equal to 600 pCi/L is considered to be at natural background levels. The highest Tritium well is projected to give an annual radiation dose of 1.043 mrem⁴ above naturally occurring concentrations. The Tritium in this well has been steadily decreasing since its peak value of 59, 570 pCi/L in March of 2006. It is expected that this well will remain elevated for some time as the water infiltration rates are very low. Consequently, the decrease will be slow and steady.

Other Newsworthy Items

1. On April 1st and 2nd judges from three boards from the Nuclear Regulatory Commission's Atomic and Safety Licensing Panel continued their three day hearings that started on March 31st to listen to arguments on the Department of Energy's license application to construct a repository at Yucca Mountain. The boards' hearings will assess the legal standings of the 12 petitioners who filed 316 contentions on the license application. The boards are expected to issue a ruling sometime in May on each petitioner's standing and decide which contentions will be admissible for the technical hearings scheduled for later this year. The hearings were web-streamed on the Internet and their videos will be available until June 29th. The videos of the sessions are 6 to 8 hours long.
2. On April 7th the Maine Legislature approved and issued a joint resolution requesting the United States Government to immediately reduce the Nuclear Waste Fund fee to cover only those costs incurred by the Department of Energy, the Nuclear Regulatory Commission (NRC) and local governments in Nevada overseeing the Yucca Mountain project. The joint resolution also advocated the immediate enactment of legislation to expedite the creation of two NRC licensed interim storage facilities to accept spent fuel with priority given to decommissioned plants. State Senator Deborah Simpson sponsored the resolution.
3. On April 7th the State of Nevada officially filed an 83 page motion asking the Federal Surface Transportation Board to suspend the Department of Energy's application to build a 319 mile rail line from Caliente to the repository site at Yucca Mountain. The states of Nevada and California also filed separate notices with the 9th U.S. Circuit Court of Appeals of their intent to file lawsuits against the DOE rail plan.

^{2 3 & 4} Refer to the Glossary on page 7

4. On April 8th the State Inspector and the Manager of the State's Radiation Control Program participated in the periodic status briefings of the Nuclear Waste Strategy Coalition (NWSC). The major topics on the agenda were the FY 2010 appropriations before Congress and the NRC license application contentions hearings held in Nevada the previous week. NWSC is an ad hoc group of state utility regulators, state attorneys general, electric utilities and associate members representing 47 stakeholders in 31 states, committed to reforming and adequately funding the U.S. civilian high-level nuclear waste transportation, storage, and disposal program.
5. On April 14th the Center for Biological Diversity submitted 11 protests with the State of Nevada over the water right applications filed by the Department of Energy to support the proposed nuclear waste repository at Yucca Mountain and its associated Caliente rail line. The protests were to protect the habitat of the imperiled Amargosa Toad.
6. On April 21st the State Inspector participated in a multi-regional discussion on the States Regional Groups' comments to the Department of Energy's (DOE) National Transportation Plan (NTP). The joint comments focused on eight broad themes for the DOE to improve their NTP. Five of the eight major topics involved transportation system design. The groups represented the Council of State Governments Eastern and Midwestern Regions and the Western Interstate Energy Board. (Note: All further activities with State Regional Groups will soon cease due to the decreased federal funding enacted by the FY 2009 Omnibus Appropriations Act that was signed into law on March 12th by President Obama.)
7. On April 22nd the Nuclear Waste Strategy Coalition (NWSC) held its periodic status briefings. The major topics on the agenda again focused on the FY 2010 appropriations before Congress, the State of Nevada's filing with the Surface Transportation Board on the 319 mile rail line for the Caliente corridor to Yucca Mountain, and the mounting States Resolutions to escrow the fees paid to the Nuclear Waste Fund for Yucca Mountain.
8. On April 22nd Senator Lindsey Graham from South Carolina introduced a bill in the Senate, S.861, that would refund the unused portion of the Nuclear Waste Fund back to the electric consumers should the Yucca Mountain Project be terminated. The legislation would refund 75% of the \$22.6 billion balance to ratepayers with the remaining funds being distributed to nuclear power facilities for security and storage upgrades. Senator Susan Collins from Maine and seven other Senators, representing seven states, were co-sponsors of the proposed legislation.
9. On April 20th the President of Connecticut Yankee and Yankee Atomic, and Chief Nuclear Officer of Maine Yankee, Mr. Wayne Norton, commented on the Department of Energy's (DOE) National Transportation Plan. His comment stressed using the Yankee decommissioned plants as part of the pilot projects envisioned by the DOE to test the national transportation system. Furthermore, he cited the recent decision of the U.S. Court of Appeals for the Federal Circuit as requiring the DOE to pick up the high level wastes, such as cut-up reactor internals, in addition to spent fuel from all three Yankee plants. The final comments stressed the dual purpose storage and transportation canisters at the three Yankees as being ideal for immediate shipment virtually eliminating the necessity to repackage the spent fuel into the DOE's Transportation, Aging and Disposal (TAD) Canisters.
10. On April 28th the State Inspector commented on the final draft of the Northeast High-Level Radioactive Waste Transportation Task Force comments to the DOE's National Transportation Plan. Emphasis was added to ensure that DOE pilot projects would first ship from decommissioned reactor sites as a means of testing the policies, procedures and processes of the transportation system. The comments were filed with the DOE on April 30th. The Northeast High-Level Radioactive Waste

Transportation Task Force is a subsidiary of the Council of State Governments Eastern Regional Conference.

11. On April 29th Senators James Inhofe from Oklahoma and Olympia Snowe from Maine along with 15 other U.S. Senators, representing 13 states, sent a letter, (a copy of which is attached at the end of the report), to Dr. Steven Chu, Energy Secretary, requesting a response to a number of questions and to provide information supporting the scientific basis for the decision that Yucca Mountain is “not an option”.

Other Noteworthy Item:

1. On March 24th Representatives Michael Michaud and Chellie Pingree of Maine along with five other Representatives serving six states, expressed their concerns in a letter, (a copy of which is attached at the end of the report), to President Obama on the suspension of Yucca Mountain as a repository for spent fuel. Each of the signatories has a distinct “stand alone, permanently shut down nuclear reactor site” in their respective states.

Glossary

Condition Report (CR): A report that promptly alerts management to potential conditions that may be adverse to quality or safety. The report is generally initiated by a worker at the ISFSI facility. The report prompts management to activate a process to identify causal factors and document corrective and preventative measures stemming from the initial report.

Decay Series: There are three naturally occurring decay series of heavy elements that transform into a series of various radioactive elements by releasing energy in the form of particles, (such as alpha or beta), and/or gamma rays to end in a stable form of non-radioactive Lead. All three decay series start with extremely long lived radioactive, heavy elements that can be measured in geologic time units. They are Uranium-238 with an approximate half-life of 4.5 billion years, Uranium -235 with a half-life of about 700 million years, and Thorium-232 with a half-life of 14 billion years. All three series contain some more well-known radioactive species, Radium and Radon.

Dose is the amount of radiation that is absorbed by a person's body. In the radiation field the term dose is sometimes used interchangeably with dose equivalent, which is defined as the rem and described below.

fCi/m³ is an acronym for a femto-curie per cubic meter, which is a concentration unit that defines how much radioactivity is present in a particular air volume, such as a cubic meter. A curie, named after its discoverers Pierre and Marie Curie, is defined as the rate at which a radioactive element transforms itself into another element that is most often another radioactive element. It is mathematically equivalent to 37 billion disintegrations or transformations per second. A "femto" is a scientific prefix for an exponential term that is equivalent to one quadrillionth (1/1,000,000,000,000,000).

Gamma Spectroscopy is a scientific method used to analyze gamma rays emanating from radioactive elements. The analytical system determines the gamma ray energy which acts as a "fingerprint" for specific radioactive materials. For example, Potassium-40 (K-40) has a very, distinctive gamma energy at 1460 keV. This uniqueness allows the instrument to positively identify the K-40 1460 energy as its own unique fingerprint. A keV is an abbreviation for kilo electron volt, which is a measure of energy at the atomic level. A kilo is a scientific prefix for the multiplier 1,000.

Gross Beta is a simple screening technique employed to measure the total number of beta particles emanating from a potentially radioactive sample, with higher values usually indicating that the sample contains natural and/or man-made radioactive elements. High values would prompt further analyses to identify the radioactive species. A beta is a negatively charged particle that is emitted from the nucleus of an atom with a mass equal to that of an orbiting electron.

Liquid Scintillation is an analytical technique by which Tritium and many other radioactive contaminants in water are measured. A sample is placed in a special glass vial that already contains a special scintillation cocktail. The vial is sealed and the container vigorously shaken to create a homogeneous mix. When the tritium transforms or decays it emits a very low energy beta particle. The beta interacts with the scintillating medium and produces a light pulse that is counted by the instrument. Although a different scintillation cocktail is used, this is basically how radon in well water is measured.

pCi/kg is an acronym for a pico-curie per kilogram, which is a concentration unit that defines how much radioactivity is present in a unit mass, such as a kilogram. A "pico" is a scientific prefix for an exponential term that is equivalent to one trillionth (1/1,000,000,000,000).

pCi/L is an acronym for a pico-curie per liter, which is a concentration unit that defines how much radioactivity is present in a unit volume, such as a liter.

Rem is an acronym for roentgen equivalent man. It is a conventional unit of dose equivalent that is based on how much of the radiation energy is absorbed by the body multiplied by a quality factor, which is a measure of the relative hazard of energy transfer by different particles, (alpha, beta, neutrons, protons, etc.), gamma rays or x-rays. In comparison the average natural background radiation dose equivalent to the United States population is estimated to be 292 millirems per year, or 0.8 millirem per day, with 68 % of that dose coming from radon. A millirem is one thousandth, (1/1000), of a rem.

Roentgen is a special unit of exposure named after the discoverer of X-Rays, Wilhelm Roentgen. It is a measure of how much ionization is produced in the air when it is bombarded with X-Rays or Gamma Rays. Ionization is described as the removal of an orbital electron from an atom. A milliRoentgen is one thousandth (1/1000) of a Roentgen.

Thermoluminescent Dosimeters (TLD) are very small plastic-like phosphors or crystals that are placed in a small plastic cage and mounted on trees, posts, etc. to absorb any radiation that impinges on the material. Special readers are then used to heat the plastic to release the energy that was stored when the radiation was absorbed by the plastic. The energy released is in the form of invisible light and that light is counted by the TLD reader. The intensity of the light emitted from the crystals is directly proportional to the amount of radiation that the TLD phosphor was exposed to.

Tritium (Hydrogen-3 or H-3) is a special name given to the radioactive form of Hydrogen usually found in nature. All radioactive elements are represented as a combination of their chemical symbol and their mass number. Therefore, Tritium, which is a heavy form of the Hydrogen molecule with one proton and two neutrons in the nucleus of its atom, is abbreviated and represented by its chemical symbol, H, for Hydrogen and 3 for the number of particles in its nucleus, or mass number. Similarly, other radioactive elements, such as Potassium-40, can be represented and abbreviated as K-40, and so on.

Addendum

Historical Perspective

Independent Spent Fuel Storage Installation (ISFSI)

In 1998 the Department of Energy (DOE) was required to take title and possession of the nation's spent nuclear fuel as mandated by the Nuclear Waste Policy Act (NWPA) of 1982. When the NWPA was enacted, Congress assumed that a national repository would be available for the disposal of the spent fuel. Since the licensing and construction of the high level waste repository at Yucca Mountain in Nevada has experienced significant delays, DOE is currently projecting that the Yucca Mountain site will not be available until at least the year 2020 or later.

DOE's inaction prompted Maine Yankee to construct an ISFSI during decommissioning to store the more than 1434 spent fuel assemblies that were previously housed in the spent fuel pool in the plant, into 60 storage casks on-site. Another four casks contain some of the more radioactive components of the reactor internals that were cut up during decommissioning, since their radioactive concentrations were too high to dispose at a low level radioactive waste facility. These are expected to be shipped along with the spent fuel to the Yucca site should the repository open.

Environmental

Since 1970 the State has maintained an independent, radiological environmental monitoring program of the environs around Maine Yankee. Over the years there was an extensive quarterly sampling and analysis program that included such media as salt and fresh water, milk, crabs, lobsters, fish, fruits, vegetables, and air. Since the decommissioning the State's program has been reduced twice to accommodate decreased revenues for sample analyses at the State's Health and Environmental Testing Laboratory (HETL). Presently, the State monitors one freshwater location, one saltwater and seaweed location, and one air sample location. The State maintains a quarterly sampling regimen, except for the air sample, which is performed bi-weekly near the old Bailey Farm House. Besides the media sampling, over the years the State has maintained a robust thermoluminescent dosimeter (TLD) program to measure the radiation environment. The TLDs were placed within a 10 to 20 mile radius of the plant to measure the background radiation levels and later, when the plant was operating, any potential increases in background levels due to plant operations. Over time the number of TLDs nearly doubled to address public concerns over the clam flats in Bailey Cove and the construction of the ISFSI. After the plant's decommissioning the State reduced the number of TLDs around Bailey Cove, but maintained the same number for the environmental surveillance of the ISFSI. A further evaluation of reducing the State's radiological environmental monitoring program is planned for the fall of 2009.

Maine Yankee Decommissioning

Maine Yankee's decommissioning was completed in the fall of 2005. At that time the State Nuclear Safety Inspector (SNSI) also commenced his final walk down survey of the site. Certain areas such as the transportation routes exiting the plant site were surveyed after the plant industrial area was decommissioned. Due to the length of the egress routes, it took a considerable amount of time to complete both half-mile east and west access routes and the two thirds of a mile of the railroad track. In addition, seven specific areas, including the dirt road, were also examined as part of the final site survey. The State's final survey of the

dirt road leading to the old softball field was extended in the fall of 2007 when the State discovered three localized elevated areas on the road that were contaminated. At that time, extensive bounding samples were taken to determine the extent of the contamination.

Because of the State's findings the original Class III designation of little or no potential for small areas of elevated activity was deemed incorrect. Therefore, the Dirt Road systematic sampling was necessary to ensure that all the State's findings would still pass Maine Yankee's License Termination Plan (LTP) Class I criteria. In September's report the results of Maine Yankee's 18 Dirt Road soil samples identified one sample with man-made Cesium-137, with the remaining radioactivity from natural radioactive elements normally found in soil and bedrock, namely Uranium and Thorium and their respective decay series, and Potassium-40. On October 16th the State met with Maine Yankee to discuss their findings. The State's analyses reported that six of their 18 soil samples contained the radioactive element Cesium-137 with the remainder from the same natural decay series and Potassium-40 that was found in the Maine Yankee samples. In both cases the findings indicated that the concentration of the Cesium-137 was low and comparable to what is normally found in nature from past weapons testing during the 1950's and 1960's. On October 31st the State issued a letter to Maine Yankee stating that, based on the recent systematic sampling and bounding efforts on the elevated areas, the results demonstrated that Maine Yankee had met its Class I LTP criteria. Therefore, the State concluded that there were no further outstanding issues relative to the Dirt Road and considered the issue closed. Even though some residual radioactivity remains, due to the localized nature of the contaminant and the restricted security access to the site, the contamination found does not present a public health hazard.

With the closure of the Dirt Road, the only remaining walk down survey left to be performed on-site is the portion of the East Access Road adjacent to the ISFSI bermed area. This area remains as the background radiation levels from the ISFSI were initially too high to survey, (greater than 30,000 counts per minute), and could mask potential elevated areas. Since then the State has been monitoring the levels every spring and has observed a steady decrease in the ambient radiation levels down to 25,000 counts per minute (cpm). When the levels reach about 20,000 cpm the area will be surveyed to close out all transportation routes at the Maine Yankee site.

The State will publish its decommissioning findings in a confirmatory summary that is expected in June of 2009. As part of that process the State will condense over 40 major survey areas into eleven confirmatory reports that are being worked on by an outside consultant. The independent consultant has been collecting all the State's findings and summarizing them in confirmatory reports that the State Nuclear Safety Inspector will use to complete the State's confirmatory summary.

Groundwater Monitoring Program

In June of 2004, the State, through the Department of Environmental Protection's (DEP) authority under 38 MRSA §1455, signed an agreement with Maine Yankee for a five year, post decommissioning radiological groundwater monitoring program at the site. Presently, the program is in its fourth year. The details of how the agreement would be carried out relative to the quality assurance facets of the monitoring, sampling and analyses would be captured in Maine Yankee's Radiological Groundwater Monitoring Work Plan.

The normal sampling regimen for the groundwater monitoring program is March, June and September of each year. However, since the first sampling took place in September of 2005, the annual sampling constitutes the September sampling of the current calendar year and finishes with the June sampling of the following year.

It should be noted that the Agreement between the State and Maine Yankee set an administrative limit of 2 mrems per year per well as a demonstration that it has met the State's groundwater decommissioning standards of a 4 mrem dose per year above background values. If a well exceeds the 2 mrem value after the five year monitoring program ends, Maine Yankee would allow the State to continue monitoring that well. To-date fifteen of the sixteen wells sampled have not exceeded one tenth of the limit, or 0.2 mrems/yr. Only well number MW-502 has come close to exceeding the 2 mrems administrative limit and that was back in March of 2006 when the dose was 1.96 mrems. Since then the Tritium in this well has been steadily decreasing. It is expected that this well will remain elevated for some time as the water infiltration rates are very low. Consequently, the decrease will be slow and steady.