April 1, 2011

MEMORANDUM TO: Undine S. Shoop, Chief
Health Physics and Human Performance Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

FROM: Richard L. Conatser, Health Physicist ***/RA/***
Health Physics and Human Performance Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF RESULTS FROM COMPLETION OF NRC's TEMPORARY INSTRUCTION TI 2515/173, "INDUSTRY GROUNDWATER PROTECTION INITIATIVE."

Temporary Instruction (TI) 2515/173, "Industry Groundwater Protection Initiative" was developed with the objective to assess ground water protection programs to determine whether licensees have implemented the voluntary industry Ground Water Protection Initiative (i.e., the objective was not to perform an assessment of the adequacy of the licensee's ground water monitoring program). The inspection determined whether licensees installed the necessary procedures and processes to respond to a leak or spill of radioactive material to groundwater. The enclosed report discusses the details of the results of the TI 2515/173 inspection of licensees' groundwater protection programs. The inspection results are a snapshot of each site's performance at the time of the NRC inspection.

Enclosure:
As stated

CONTACT: Richard Conatser, NRR/DIRS
301-415-4039

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Summary of Results from Completion of NRC's Temporary Instruction on Groundwater Protection, TI-2515/173 Industry Groundwater Protection Initiative

29-Mar-11

Executive Summary:

The nuclear reactor industry in the United States committed to adopt a voluntary industry initiative to protect the groundwater. This initiative resulted from significant leaks being discovered at some nuclear power plants and subsequent NRC actions including issuing violations and exploring changes to the regulatory framework. Between August 2008 and August 2010, the Nuclear Regulatory Commission (NRC) inspected all 65 nuclear power plant sites to gauge industry's progress with respect to implementation of the initiative. This report discusses the details of NRCs assessment of the implementation status of the initiative.

As a result of the industry groundwater protection initiative and additional regulatory activities by the NRC, the preparedness for and response to situations involving inadvertent radiological releases has improved. Additionally, the licensee's communications with external stakeholders, such as local municipalities and state governments, has improved over the last 4 years. The areas in which the industry has achieved the highest implementation rates were in Record Keeping, 30-Day Reports to the NRC, and Annual Reports to the NRC. The NRC did, however, find areas for improvements, particularly in the areas of Site Risk Assessments, Remediation Processes, and Stakeholder Briefings.

Across the industry, about 92% of the 42 program elements in the voluntary industry initiative were implemented. The 8% of the tasks that were not implemented were spread across about 40% of the nuclear facility sites. Therefore, about 60% of the sites had implemented all 42 program elements found in the voluntary industry initiative.

This report is a snapshot of each site's performance at the time of the NRC inspection. Some of the inspections were conducted more than 2 years ago, and because overall industry implementation of the program elements has been increasing over time, the current industry implementation status is expected to be better than what is indicated in this report.

The NRC will conduct additional inspections at all sites to check for gaps in implementing the voluntary industry initiative through the reactor oversight process baseline inspection program and an additional TI to inspect and verify that appropriate corrective actions have been taken.

Introduction:

In August 2007, the US nuclear industry chief nuclear officers voted to adopt NEI 07-07, "*Industry Groundwater Protection Initiative*," a voluntary groundwater protection initiative. After NEI 07-07 was adopted by the industry, the NRC developed Temporary Instruction TI-2515/173, "*Review of the Implementation of the Industry Groundwater Protection Voluntary Initiative*," to

evaluate each licensee's implementation of NEI 07-07. NRC inspectors visited each site to perform the inspection and determine if the licensee's groundwater monitoring program contained all of the program elements as outlined in the NEI initiative. The inspections began in August 2008 and were completed during the 2 year inspection cycle between August 2008 and August 31, 2010.

Evaluation Criteria:

NEI 07-07 contains the following 3 major program actions.

(1) Establish a Groundwater Protection Program,
(2) Improve Communications, and
(3) Perform Program Oversight.

Each program action is comprised of two or more program objectives. The program objectives are listed in the column headings on Tables 1 through 4. Each program objective is comprised of several acceptance criteria. Although NEI 07-07 uses the term acceptance criteria, they will be referred to in this document as program elements. In all, there are 11 program objectives and the NRC identified 42 program elements. During completion of the TI, the NRC evaluated the licensee's ability to implement these 42 program elements.

Process:

NRC Inspectors visited each site between August 2008 and August 2010 and used the TI to determine if the licensee's groundwater protection program contained the program elements listed in NEI 07-07. The licensee had to demonstrate to the inspector that the program element was present. The results of the TI inspections were included in the NRC Inspector's quarterly inspection reports for each licensee. The inspectors' evaluations were compiled and compared to the objectives in the TI. For each objective, the licensee's performance was rated as complete, not complete, or blank. These responses have the meanings specified below:

Complete = The licensee's groundwater monitoring program contained the necessary program elements as outlined in the TI.

Not Complete = The licensee's groundwater monitoring program did not contain the necessary program elements as outlined in the TI, or the licensee was not able to demonstrate to the inspector that the licensee's monitoring program contained the necessary program elements.

Blank = The information contained in the NRC quarterly inspection report was not detailed enough to determine if the licensee's program was complete or not complete. However, since the program

element was not identified in the report as incomplete the blank responses will be treated as complete program elements.

A matrix was created which contained the 42 program elements, and each site received either a complete, not complete, or a blank for each element. The number of complete program elements and the number of not-complete program elements were tabulated to provide an assessment of industry implementation of the groundwater protection initiative.

The assignment of a complete or a not complete rating for each program element is a qualitative assessment. For example, one of the program elements instructs licensees to perform a hydrogeologic study to determine groundwater flow direction and gradients. In this case, a rating of complete indicates the inspector concluded the study was conducted and documented by a qualified professional and the documentation included flow direction and gradients. It does not indicate that the NRC inspectors performed an independent, confirmatory study to validate the accuracy of the results, or that the inspectors verified how the licensee used the hydrogeologic study as part of the licensee's groundwater monitoring program.

Raw Results:

In order to present the data in this report, it has been subdivided by region and included in Tables 1 through 4.

The number of program elements that were rated incomplete for each nuclear power plant site is listed in Tables 1 through 4. The results are grouped by program objective. Table 5 summarizes the number of incomplete ratings for each region and the total number of incomplete ratings for all nuclear power plant sites.

Summary Discussion of Results:

The data indicates some disparity between the regions with respect to the number of "incomplete" ratings. Although the number of incomplete ratings varied by region, the data from all regions indicated that most of the incomplete ratings were associated with just a few program objectives.

The objectives most-often rated as incomplete were:

Objective 1.4, Remediation Process

Objective 1.2, Site Risk Assessment

Objective 3.2, NEI Independent Program Assessments, and

Objective 2.1, Stakeholder Briefings.

These are areas where more industry focus may be warranted and where additional NRC focus may be needed to verify industry's actions are appropriate in these areas. Conversely, the

results from all regions indicate the program objectives with the fewest number of incomplete responses were:

Objective 1.5, Record Keeping for Decommissioning

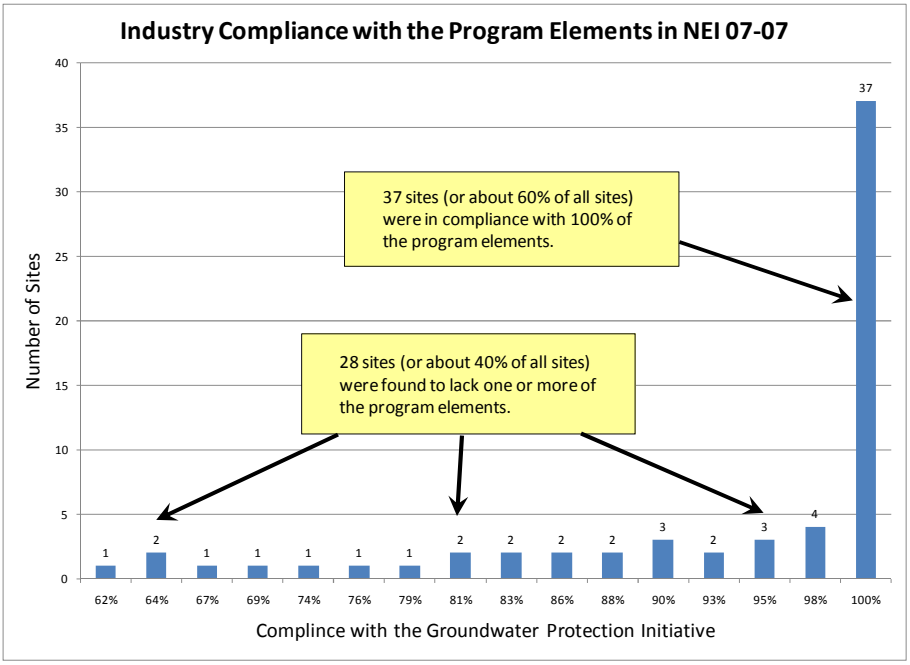
Objective 2.3, Submit Formal, Written Reports of Groundwater Results to NRC and Stakeholders within 30 Days, and

Objective 2.4, Reporting Groundwater Results in Annual Reports.

With respect to the industry as a whole, these are the areas where NRC focus, above and beyond the routine baseline inspections, may not be needed.

Another measure of industry-wide implementation of the program elements is the percentage of elements that have been implemented. With 65 sites, each implementing 42 program elements, there are a total of 2,730 program elements for all reactor sites. Of this total, 183 (or about 8%) of the program elements were rated incomplete across the industry. This indicates a 92% overall-industry-average compliance with the groundwater protection initiative. If a site is below the industry average, it does not necessarily indicate that there will be an inadequate response to a spill or leak. However, it is reasonable to expect those sites with 100% compliance to the initiative will have a higher potential to readily and appropriately respond to a leak or spill than a site that complies with only 80% of the program elements in the industry initiative. This is the basis for the concept of a "readiness potential." The following paragraph introduces this concept.

Overall, 37 of the 65 sites (or about 60% of the sites) had implemented all (i.e., 100%) of the program elements in the NEI initiative. This data indicates these sites have the program elements necessary to enhance the response and remediation of potential threats to groundwater. Conversely, 28 sites (or about 40% of the sites) did not satisfy at least 1 of the 42 program elements listed in the NEI



initiative. To characterize the groundwater protection programs that had one or more incomplete program elements, additional context is needed. For example, if a licensee completes 41 out of the total of 42 tasks, this indicates 98% of the program elements were present in that program. With 98% of the program elements in place at a site, there is a high likelihood that the site's groundwater protection program will enhance the response and remediation of potential threats to groundwater. For purposes of summarizing the data in this report, a success rate greater than 90% indicates there is a reasonable likelihood that the licensee will not encounter unnecessary difficulties or challenges when responding to a groundwater contamination event. This report classifies such sites as having a readiness potential of "1". The readiness potential is a ranking system that uses the data in this TI to predict the preparedness of a site to effectively respond to potential spills and leaks. Readiness potentials for each site are listed in Tables 1-4.

For purposes of summarizing the data in this report, if a licensee completed less than 80% of the program elements, it indicates there is an increased likelihood (but not a certainty) that the licensee may encounter difficulties when responding to a potential groundwater contamination event. These difficulties may manifest themselves in a number of ways, and may include (1) an unnecessary delay in responding to the event, (2) a unnecessary delay in providing the most pertinent and concise information to the NRC and the public, or (3) an inability to communicate complete and accurate information in a timely manner. Because the regulatory framework is sufficiently robust, these difficulties would not be expected to impact the licensee's ability to satisfy the regulatory requirements. This report classifies such sites as having a readiness potential of "3".

Those licensees with success rates from 80% to 90% are assigned a readiness potential of "2". The groundwater programs at these sites did not incorporate between 5 to 8 program elements from the industry initiative. These sites may also encounter a challenge when responding to a potential groundwater contamination event.

This report is a snapshot of each site's performance at the time of the NRC inspection. All NRC groundwater inspections were conducted between August 2008 and August 2010. Licensees who were found to have gaps in their groundwater programs entered those deficiencies into their corrective action program. Some of the inspections were conducted more than 2 years ago, and because overall industry implementation of the program elements has been increasing over time, the current industry implementation status is expected to be better than what is indicated in this report.

Conclusions:

Across the industry, about 92% of the program elements in the voluntary industry initiative were implemented. About 60% of the power plants were rated complete on all the objectives, while about 40% of the plants were rated incomplete in at least 1 of the 42 program element in NEI 07-07. The program objectives that were most often not met were (1) remediation processes,

(2), site risk assessments for systems, structures and components on site (3) NEI independent self-assessments, and (4) stakeholder briefings.

Because overall industry implementation of the program elements has been increasing over time, the current implementation status is expected to be better than what is indicated in this report.

The NRC will conduct additional inspection at all sites to check for gaps in implementing the voluntary industry initiative through the reactor oversight process baseline inspection program and an additional TI to inspect and verify that appropriate corrective actions have been taken.

Next Steps:

The NRC will conduct additional inspection at all sites to check for gaps in implementing the voluntary industry initiative and to ensure the trend of improvements seen over the last 4 years continues. These inspections will be performed based on the number of incomplete program elements as follows:

- For licensees with 4 or less incomplete program elements, NRC staff as part of the routine baseline inspections will use IP-71124.06, "Radioactive Gaseous and Liquid Effluent Treatment, Section 06.a, "GPI Implementation" to inspect and verify that the licensee has taken corrective actions to complete the incomplete program elements through its corrective action program.

- For licensees with 5 or more incomplete program elements, NRC staff revise and re-issue the TI to inspect and verify that the licensee has taken appropriate corrective actions.

Table 1

Number of Program Elements Rated Incomplete in Region 1 (for 2008-2010)

The 11 Objectives in NEI 07-07 are listed at the right.	Readiness Potential (2008-2010)*	Hydrology and Geology	Site Risk Assessment	On-Site Groundwater Monitoring	Remediation Process	Record Keeping	Stakeholder Briefings	Voluntary Communications	30-Day Reports	Annual Reports	Self Assessments	NEI Program Assessments
Region 1		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2
Beaver Valley	1											
Calvert Cliffs	1											
FitzPatrick	3		**4**	**4**	**3**							
Ginna	2	**3**	**3**	**2**								
Hope Creek	1											
Indian Point	1											
Limerick	1											
Millstone	1											
Nine Mile Point	1											**1**
Oyster Creek	2		**1**	**1**	**3**						**1**	**1**
Peach Bottom	1		**2**	**2**								**1**
Pilgrim	1											
Salem	1											
Seabrook	1											
Susquehanna	1											
Three Mile Island	2		**1**	**1**	**2**	**1**						**1**
Vermont Yankee	3	**3**	**6**	**1**						**1**	**3**	**1**

* Sites with a readiness potential of "1" should have the highest potential to effectively manage leaks and spills. Licensees with a readiness potential of "2" or "3" may have successively higher potentials to experience challenges when confronted by a leak or spill to groundwater. This is a snapshot of implementation status between August 2008 and August 2010, and current program status may be different. See the sections "Raw Results" and "Summary Discussion of Results" for additional information.

Table 2

Number of Program Elements Rated Incomplete in Region 2 (for 2008-2010)

The 11 Objectives in NEI 07-07 are listed at the right.	Readiness Potential (2008-2010)*	Hydrology and Geology	Site Risk Assessment	On-Site Groundwater Monitoring	Remediation Process	Record Keeping	Stakeholder Briefings	Voluntary Communications	30-Day Reports	Annual Reports	Self Assessments	NEI Program Assessments
Region 2		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2
Browns Ferry	1											
Brunswick	1											
Catawba	1											
Crystal River	1											
Farley	1						**3**					
Harris	1											
Hatch	1		**1**									
McGuire	1											
North Anna	1											
Oconee	1											
Robinson	1											
Saint Lucie	1											
Sequoyah	1											
Summer	1											
Surry	1											
Turkey Point	1											
Vogtle	1											
Watts Bar	1							**1**				

* Sites with a readiness potential of "1" should have the highest potential to effectively manage leaks and spills. Licensees with a readiness potential of "2" or "3" may have successively higher potentials to experience challenges when confronted by a leak or spill to groundwater. This is a snapshot of implementation status between August 2008 and August 2010, and current program status may be different. See the sections "Raw Results" and "Summary Discussion of Results" for additional information.

Table 3

Number of Program Elements Rated Incomplete in Region 3 (for 2008-2010)

The 11 Objectives in NEI 07-07 are listed at the right.	Readiness Potential (2008-2010)*	Hydrology and Geology	Site Risk Assessment	On-Site Groundwater Monitoring	Remediation Process	Record Keeping	Stakeholder Briefings	Voluntary Communications	30-Day Reports	Annual Reports	Self Assessments	NEI Program Assessments
Region 3		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2
Braidwood	1											
Byron	1				**2**		**1**					
Clinton	1											
D.C. Cook	1											
Davis-Besse	1				**1**							**1**
Dresden	1			**3**	**1**							
Duane Arnold	1											
Fermi	1											
Kewaunee	2		**2**		**2**	**1**	**3**					
La Salle	1		**1**									
Monticello	1						**2**					
Palisades	1		**3**		**1**							
Perry	2	**1**	**1**	**1**	**1**			**3**				
Point Beach	1											
Prairie Island	1											
Quad Cities	1			**2**								

* Sites with a readiness potential of "1" should have the highest potential to effectively manage leaks and spills. Licensees with a readiness potential of "2" or "3" may have successively higher potentials to experience challenges when confronted by a leak or spill to groundwater. This is a snapshot of implementation status between August 2008 and August 2010, and current program status may be different. See the sections "Raw Results" and "Summary Discussion of Results" for additional information.

Table 4

Number of Program Elements Rated Incomplete in Region 4 (for 2008-2010)

The 11 Objectives in NEI 07-07 are listed at the right.	Readiness Potential (2008-2010)*	Hydrology and Geology	Site Risk Assessment	On-Site Groundwater Monitoring	Remediation Process	Record Keeping	Stakeholder Briefings	Voluntary Communications	30-Day Reports	Annual Reports	Self Assessments	NEI Program Assessments
Region 4		1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2
Arkansas Nuclear	3		**5**	**1**				**1**		**2**		
Callaway	3		**4**	**3**	**3**							
Columbia	2		**5**									
Comanche Peak	1											
Cooper	3	**4**	**7**		**3**					**2**		
Diablo Canyon	3		**7**		**3**			**4**			**1**	
Fort Calhoun	1											
Grand Gulf	1											
Palo Verde	1							**4**				
River Bend	3	**2**	**6**	**3**	**1**					**1**	**1**	
San Onofre	1											
South Texas	1											
Waterford	3	**2**	**6**	**3**	**1**						**1**	
Wolf Creek	1											

* Sites with a readiness potential of "1" should have the highest potential to effectively manage leaks and spills. Licensees with a readiness potential of "2" or "3" may have successively higher potentials to experience challenges when confronted by a leak or spill to groundwater. This is a snapshot of implementation status between August 2008 and August 2010, and current program status may be different. See the sections "Raw Results" and "Summary Discussion of Results" for additional information.

Table 5

Incomplete Ratings for Each Region (and for All Regions Collectively)

The 11 Objectives in NEI 07-07 are listed at the right.	Hydrology and Geology	Site Risk Assessment	On-Site Groundwater Monitoring	Remediation Process	Record Keeping	Stakeholder Briefings	Voluntary Communications	30-Day Reports	Annual Reports	Self Assessments	NEI Program Assessments
	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	3.1	3.2
Region 1											
# of Incomplete Elements	6	20	11	11	1				1	4	5
% Incomplete	8%	19%	11%	23%	6%	0%	0%	0%	1%	10%	36%
Region 2											
# of Incomplete Elements		1				3	1				
% Incomplete	0%	1%	0%	0%	0%	10%	3%	0%	0%	0%	0%
Region 3											
# of Incomplete Elements	1	7	6	8	1	6	3				1
% Incomplete	2%	14%	11%	29%	9%	21%	8%	0%	0%	0%	25%
Region 4											
# of Incomplete Elements	8	40	10	11			9		5	3	
% Incomplete	23%	66%	22%	55%	0%	0%	69%	0%	19%	17%	0%
Total for All Regions											
# of Incomplete Elements	12	51	21	25	2	8	12		4	7	4
% Incomplete	5%	17%	7%	18%	4%	6%	6%	0%	2%	5%	13%

The number of program elements that were not completed in each of the objectives listed in NEI 07-07 and the percentage of incomplete program elements for each objective are listed in this table. The highlighted values indicate objectives with the highest number of incomplete program elements in each of the four NRC regions. The industry totals are shown at the bottom of the table. See the sections "Raw Results" and "Summary Discussion of Results" for additional information.