

Duane Arnold 3Q/2012 Plant Inspection Findings

Initiating Events

Significance: G Feb 10, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

Flammable Gas Bottles Installed in the Reactor Building (Section 1R05.11b)

The inspectors identified a finding of very low safety significance and associated NCV of Title 10, Code of Federal Regulations (CFR) Part 50, Appendix B, Criterion III, "Design Control," for the failure to check the adequacy of design for flammable gas bottles installed in the reactor building and their impact on safety-related cables and safety-related equipment. Specifically, the licensee failed to evaluate how a failure of the flammable gas bottles and the resulting fire or explosion at the installed locations could impact nearby safety-related structures, systems, or components. The licensee entered this issue into their corrective action program to review the placement of the flammable gas bottles.

The inspectors determined that the finding was more than minor because the finding was associated with the Initiating Events cornerstone attribute of Protection against External Factors (Fire) and affected the cornerstone's objective of limiting the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The finding was of very low safety significance due to the low fire initiating frequency and the availability of remaining mitigating systems. This finding did not have a cross-cutting aspect because the finding was not representative of current performance.

Inspection Report# : [2012007](#) (*pdf*)

Significance: G Dec 31, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

CANCELLATION OF RIVER SURVEY WORK ORDER CAUSES INOPERABILITY OF RIVER WATER SYSTEM.

A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self revealed on August 11, 2011, when both river water supply subsystems were rendered inoperable following a sediment intrusion event. Specifically, the cause of the event was attributed to the cancellation of a river bed survey that would have identified the increased sediment buildup requiring increased monitoring and corrective actions (dredging, sand pumping, and/or structural repairs). The cancellation of the river bed survey work order was contrary to the requirements of Administrative Control Procedure 1208.3, "Preventive Maintenance Program," that required management approval prior to cancelling the work order that was tied to the corrective action program. This issue of concern was documented in the licensee's corrective action program as condition report 01676836. Corrective actions included revision to affected river survey work orders to ensure that they could not be cancelled without adequate review and approval, and completion of river dredging and repairs to the upstream spur dikes.

The inspectors determined that the issue of concern represented a performance deficiency because it was the result of the licensee's failure to meet a procedural requirement, and the cause was reasonably within the licensee's ability to

foresee and correct and should have been prevented. The performance deficiency was determined to be more than minor and a finding because it was associated with the Initiating Events Cornerstone attribute of equipment performance, and it affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during power operations. The inspectors applied IMC 0609, Attachment 4, "Phase 1 Initial Screening and Characterization of Findings," to this finding. Because the finding did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available under the Initiating Events Cornerstone column of Table 4a, the finding was determined to be of very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Human Performance, having Decision Making components, and involving the licensee making safety or risk significant decisions using a systematic process, including formally defining the authority and roles for decisions affecting nuclear safety. Specifically, several decisions were made with respect to spur dike repairs and river monitoring; however, the requisite organizational reviews and approvals associated with the river were not performed to ensure appropriate actions were taken.

Inspection Report# : [2011005](#) (*pdf*)

Mitigating Systems

Significance:  Sep 30, 2012

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

DIESEL FIRE PUMP OVERHEATING DUE TO INADEQUATE TEST PROCEDURE.

A finding of very low safety significance and associated non-cited violation (NCV) of Technical Specification (TS) 5.4.1.d, Fire Protection Program Implementation, was self-revealed on June 24, 2012, for the failure of the licensee to test the diesel fire pump in accordance with established procedures recommended by the equipment manufacturer. Specifically, licensee surveillance test procedure (STP) NS13B015, "Diesel Driven Fire Pump Periodic Pump Run," did not ensure the coolant tank was completely filled with water prior to operation as recommended in the equipment manufacturer's operation and maintenance manual; leading to the diesel fire pump overheating and being declared non-functional. Corrective actions by the licensee included replacing the degraded coolant reservoir tank and revising applicable procedures to implement the recommendations by the equipment manufacturer.

The inspectors determined that failing to test the diesel fire pump in accordance with established procedures recommended by the equipment manufacturer was a performance deficiency because it was the failure to meet a TS requirement, and the cause was reasonably within the licensee's ability to foresee and prevent and should have been corrected. The performance deficiency was determined to be more than minor and a finding because it was associated with the Protection Against External Factors (Fire) attribute of the Mitigating Systems Cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. An NRC regional Senior Risk Analyst determined the finding was of very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross-cutting aspect of Problem Identification and Resolution, having Corrective Action Program components, and involving the licensee taking appropriate corrective actions to address safety issues and adverse trends in a timely manner commensurate with their safety significance and complexity.

Inspection Report# : [2012004](#) (*pdf*)

Significance:  Jun 30, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

LACK OF PROCEDURES FOR MONITORING THE PERFORMANCE OF RHRSW PUMP MOTOR COOLING COILS.

The inspectors identified a finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to prescribe a procedure for activities affecting quality. Specifically, the licensee did not develop procedures for monitoring the thermal performance of the residual heat removal service water pump motor upper thrust bearing oil cooling coils. This finding was entered into the licensee's corrective action program (CAP) to generate procedures to collect monitoring data and to correlate to design conditions.

The performance deficiency was determined to be more than minor because it was associated with the procedure quality and equipment performance attribute of the Mitigating Systems Cornerstone, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding screened as of very low safety significance (Green) because the finding was a qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed a functionality evaluation and determined the most limiting cooler had sufficient margin. The inspectors determined that this finding had a cross-cutting aspect in the area of human performance because the licensee did not ensure supervisory and management oversight of work activities associated with the performance of residual heat removal service water pump motor cooler functional testing. Specifically, management did not ensure personnel developed procedures conforming to their Quality Assurance Program to be used when performing activities affecting quality.

Inspection Report# : [2012003](#) (*pdf*)

Significance:  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

LACK OF ACCEPTANCE CRITERIA WITHIN EMERGENCY CORE COOLING SYSTEM SURVEILLANCE PROCEDURE.

A finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," was identified by the inspectors on February 2, 2012, for the licensee's failure to prescribe a procedure appropriate to the circumstances and include appropriate acceptance criteria in Surveillance Test Procedure (STP) 3.5.1 15, "RHR System Water Fill Test," Revision 1. Specifically, STP 3.5.1 15 did not provide guidance for quantifying the size of any voids within the system, such that the effect on system operability could not be readily evaluated, nor did the STP establish criteria for an acceptable as found condition. The licensee entered this issue into the corrective action program (CAP) as condition report (CR) 1731106 and initiated procedure revisions to provide appropriate acceptance criteria.

The inspectors determined that failing to establish appropriate acceptance criteria for a Technical Specification (TS) surveillance procedure was a performance deficiency. The performance deficiency was determined to be more than minor and a finding because it was associated with the procedure quality attribute of the Mitigating Systems Cornerstone, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The finding was evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 Initial Screening and Characterization of Findings," Table 4a for the Mitigating Systems Cornerstone. The finding screened as of very low safety significance (Green) because the finding was a qualification deficiency confirmed not to result in loss of operability or functionality. The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting area of Problem Identification and Resolution, having Corrective Action Program components, such that issues potentially affecting nuclear safety are promptly identified (at a low threshold), fully evaluated, and that actions are taken to address safety

issues in a timely manner.

Inspection Report# : [2012002](#) (*pdf*)

Significance:  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

BATTERY CONDITIONS ADVERSE TO QUALITY NOT PROMPTLY IDENTIFIED.

A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors on January 23, 2012, for the licensee's failure to promptly identify and correct safety related direct current (DC) battery system conditions adverse to quality. Specifically, several through lid cracks on the 1D1 and 1D2 125 volts direct current (VDC), and 1D4 250 VDC batteries, that were considered degraded conditions, were not promptly identified by the licensee. The susceptibility and progression of lid cracking was a known condition; however, monitoring of the condition was not adequate to ensure correction of the conditions prior to impacting the qualification of the batteries. The licensee entered the inspector's issues into the CAP as CRs 01727026, 01727028 and 01727030. The licensee performed prompt operability determinations (PODs) that determined the affected DC electrical subsystems were operable, but degraded, pending restoration of the batteries to full qualification (epoxy repairs).

The inspectors determined that failing to promptly identify and correct battery lid cracking that impacted qualification represented a performance deficiency because it was the result of the licensee's failure to meet a regulatory requirement, and the cause was reasonably within the licensee's ability to foresee and correct and should have been prevented. The performance deficiency was determined to be more than minor and a finding because, if left uncorrected, failing to promptly identify and evaluate the operability of a degraded condition would have the potential to lead to a more significant safety concern. The inspectors evaluated the finding in accordance with IMC 0609.04, Table 4a. Because the finding was a qualification deficiency confirmed not to result in loss of operability (Question 1 under the Mitigating Systems Cornerstone column), the finding screened as very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Human Performance, having Resources components, and involving the licensee maintaining long term plant safety by maintenance of design margin and minimization of long standing equipment issues.

Inspection Report# : [2012002](#) (*pdf*)

Significance:  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

INADEQUATE CAUSAL EVALUATION AND CORRECTIVE ACTIONS FOR LOSS OF RHR SYSTEM LPCI SAFETY FUNCTION DUE TO INOPERABLE ECCS INSTRUMENTATION.

A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action" was identified by the inspectors on March 7, 2012, following review of apparent cause evaluation (ACE) 01720033 associated with the loss of Low Pressure Coolant Injection (LPCI) loop select capability. Specifically, the inspectors identified several concerns with the implementation of the licensee's corrective action program characterization of CR 01720033 that resulted in the inadequate evaluation of cause, extent of cause and condition; and incomplete corrective actions to prevent recurrence. The licensee entered the issue into the CAP as CR 01742201, and was in the process of revising the original causal evaluation and performing an additional ACE to investigate the CAP implementation issues.

The inspectors determined that failing to properly determine the cause and take corrective actions to prevent recurrence for LPCI loop select instrument failures represented a performance deficiency. The performance deficiency

was determined to be more than minor and a finding because, if left uncorrected, failing to properly determine the cause and take corrective actions to prevent recurrence for significant conditions adverse to quality would have the potential to lead to a more significant safety concern. The inspectors evaluated the finding in accordance with IMC 0609.04, Table 4a. Because the inspectors answered “No” to all five screening questions under the Mitigating Systems Cornerstone column, the finding screened as very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Human Performance, having Decision Making components, and involving the licensee making safety significant or risk significant decisions using a systematic process, especially when faced with uncertain or unexpected plant conditions, to ensure safety is maintained.

Inspection Report# : [2012002](#) (*pdf*)

Barrier Integrity

Significance:  Jun 30, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

INADEQUATE TESTING FOLLOWING MAINTENANCE ON SECONDARY CONTAINMENT ISOLATION DAMPERS.

A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified by the inspectors on May 31, 2012, for the licensee’s failure to conduct post-maintenance testing in accordance with Maintenance Directive (MD) 024, “Post-Maintenance Testing Program.” Specifically, post-maintenance testing on secondary containment isolation damper 1V-AD-17A3 was not adequate to verify the ability of the secondary containment to perform its intended function and it did not verify that no new problems were created (interference with damper 1V-AD-17B3) as a result of the maintenance performed. The licensee entered this issue into the CAP as condition report (CR) 01771837 and was in the process of evaluating the adequacy of maintenance practices and formulating corrective actions at the end of the inspection period.

The inspectors determined that failing to perform adequate post-maintenance testing was a performance deficiency because it was the result of the licensee’s failure to meet a procedural requirement, and the cause was reasonably within the licensee’s ability to foresee and correct and should have been corrected. The performance deficiency was determined to be more than minor and a finding because it was associated with the structure, system, and component (SSC) and barrier performance attribute of the Barrier Integrity Cornerstone, and adversely affected the cornerstone objective of providing reasonable assurance that physical design barriers (secondary containment) protect the public from radionuclide releases caused by accidents or events. The inspectors evaluated the finding in accordance with IMC 0609.04, Table 4a. Because the finding only represented a degradation of the radiological barrier function provided for the secondary containment (Question 1 under the Containment Barrier column), the finding screened as very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross-cutting aspect of Human Performance, having Work Control components, and involving the licensee appropriately planning and coordinating work activities by incorporating risk insights.

Inspection Report# : [2012003](#) (*pdf*)

Significance:  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

SECONDARY CONTAINMENT AIRLOCK DOOR INTERLOCK SYSTEM CONDITIONS ADVERSE TO QUALITY NOT PROMPTLY CORRECTED.

A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors on February 21, 2012, for the licensee's failure to promptly correct secondary containment (SCT) airlock door interlock system conditions adverse to quality. Specifically, the inspectors identified several instances during 2010 and 2011 where the licensee did not adequately correct interlock system conditions resulting in simultaneous opening of SCT airlock doors. For each occurrence, the interlock system conditions resulted in unplanned inoperability of secondary containment and entries into short term limiting condition for operation (LCO) action statements. The licensee entered the inspector's concerns into the CAP as CR 01716446 and CR 01737495, and was in the process of performing a condition evaluation and apparent cause evaluation.

The inspectors determined that the licensee's failure to promptly correct SCT airlock door interlock system conditions adverse to quality represented a performance deficiency. The performance deficiency was determined to be more than minor and a finding because, if left uncorrected, failing to promptly correct conditions adverse to quality would have the potential to lead to a more significant safety concern. The inspectors evaluated the finding in accordance with IMC 0609.04, Table 4a. Because the inspectors answered "No" to all questions under the Containment Barrier column, the finding screened as very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Human Performance, having Decision Making components, and involving the licensee making safety significant or risk significant decisions using a systematic process, especially when faced with uncertain or unexpected plant conditions, to ensure safety is maintained.

Inspection Report# : [2012002](#) (pdf)

Significance:  Dec 31, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

PROCEDURAL NON-COMPLIANCE RESULTS IN REACTOR BUILDING CRANE COLLIDING WITH ISFSI INSPECTION STAND.

A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self revealed on October 31, 2011, when operators failed to follow Operating Instruction 999, "Reactor Building Crane." Specifically, this error resulted in the reactor building (RB) crane striking the Independent Spent Fuel Storage Installation (ISFSI) inspection stand. Immediate corrective actions included performing inspections of the dry storage container transfer cask, ISFSI inspection stand, and reactor building crane.

The inspectors determined that attempting to move the crane over the ISFSI work platform while the hand rails were installed was contrary to the RB crane operating instruction and was an issue of concern. Failing to follow the RB crane operating instruction was a performance deficiency because it was the result of the licensee's failure to meet a procedural requirement, and the cause was reasonably within the licensee's ability to foresee and correct and should have been prevented. The performance deficiency was determined to be more than minor and a finding because, if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Specifically, not following the RB crane operating instructions could lead to a more significant event or cause damage to safety-related equipment. The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 Initial Screening and Characterization of Findings," Table 4a for the Barrier Integrity Cornerstone. Because the finding only affected the fuel barrier, the finding was determined to be of very low safety significance (Green). The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Human Performance, having Work Control components, and involving appropriately coordinating work activities by incorporating actions to address the need to keep personnel apprised of work status, the operational impact of work activities, and plant conditions that may affect work activities. Specifically, the licensee did not

implement appropriate work controls to ensure the hand rails of the ISFSI inspection stand were removed prior to moving the crane for an activity that was not associated with the ISFSI project.

Inspection Report# : [2011005](#) (*pdf*)

Emergency Preparedness

Occupational Radiation Safety

Significance:  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

FAILURE TO PROPERLY LABEL AND MAINTAIN LABELS ON CONTAINERS IN THE RADIOACTIVE WASTE FACILITY.

A finding of very low safety significance and associated NCV of 10 CFR 20.1904(a) was identified by the inspectors on January 31, 2012, due to the licensee's failure to label several containers holding radioactive material in the radioactive waste facility and two sea land containers inside the radiologically controlled area (RCA). In some cases, the licensee also failed to assure that labels were affixed and readable to support the function of providing information to radiation workers in the vicinity. The licensee entered the inspector's issues into the CAP as CR 01730867.

The inspectors determined that the licensee's failure to appropriately affix labels to containers storing radioactive material in the radioactive waste facility and perform periodic reviews of labeling conditions was a performance deficiency. The inspectors determined that the performance deficiency was more than minor and a finding because, if left uncorrected, failing to ensure labeling of radioactive material would have the potential to lead to a more significant safety concern. The inspectors evaluated the finding in accordance with IMC 0609 Appendix C, "Occupational Radiation Safety Significance Determination Process." The finding was determined to be of very low safety significance (Green) because the performance deficiency did not affect As Low As Is Reasonably Achievable Planning or Work Controls, did not involve an overexposure, there was not a substantial potential for overexposure, and the ability to assess dose was not compromised. The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Problem Identification and Resolution, having Self and Independent Assessment components, and involving the licensee not conducting self assessments at an appropriate frequency and with sufficient depth, objectivity, and critical assessment.

Inspection Report# : [2012002](#) (*pdf*)

Significance:  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

FAILURE TO MAINTAIN TYPE A CONTAINER DESIGN TESTS.

A finding of very low safety significance and associated NCV of 10 CFR 71.5 was identified by the inspectors on February 2, 2012, due to the licensee's failure to maintain a licensed material shipment on file for at least one year after the latest shipment, and not providing on request, complete documentation of tests supporting the engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction complied with the Type A specification. Specifically, the licensee maintained a container certificate from

the owner of a container that stated the container complied with the specification testing of 49 CFR 173.465, but upon further review, the testing basis for the engineering evaluation could not be produced by the package owner for the use of the shipper and review by the NRC. The licensee entered this issue into the CAP as CR 01730713.

The inspectors determined that the licensee's failure to maintain a licensed material shipment on file for at least one year after the latest shipment, and not providing on request, complete documentation of tests supporting the engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with the Type A specification, was a performance deficiency. The inspectors determined that the performance deficiency was more than minor and a finding because, if left uncorrected, failing to maintain and provide licensed material shipment documentation would have the potential to lead to a more significant safety concern. The inspectors evaluated the finding in accordance with IMC 0609 Appendix D, "Public Radiation Safety Significance Determination Process." The finding was determined to be of very low safety significance (Green) because the performance deficiency did not involve exceeding a radiation limit, a breach of package during transit, a certificate of compliance, low level ground burial, or failure to make notification or provide emergency information. The inspectors determined that the contributing cause that provided the most insight into the performance deficiency was associated with the cross cutting aspect of Human Performance, having Work Practices components, and involving the licensee not ensuring supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported.

Inspection Report# : [2012002](#) (pdf)

Public Radiation Safety

Security

Although the Security Cornerstone is included in the Reactor Oversight Process assessment program, the Commission has decided that specific information related to findings and performance indicators pertaining to the Security Cornerstone will not be publicly available to ensure that security information is not provided to a possible adversary. Other than the fact that a finding or performance indicator is Green or Greater-Than-Green, security related information will not be displayed on the public web page. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

Significance: SL-IV Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

FAILURE TO MAKE REQUIRED EIGHT HOUR EVENT REPORT PER 10 CFR 50.72 (b)(3)(v)(B).

A Severity Level (SL) IV NCV of 10 CFR 50.72(b)(3)(v)(B) was identified by the inspectors for the licensee's failure to report within eight hours a condition that, at the time of discovery, could have prevented the fulfillment of the Residual Heat Removal (RHR) system Low Pressure Coolant Injection (LPCI) safety function. Specifically, on December 2, 2011, a sizable void was identified in the 'B' LPCI discharge injection line resulting in the LPCI mode of RHR being declared inoperable. The licensee documented the issue into their corrective action program (CAP), reported the condition to the NRC on December 8, 2011, and, was in the process of reviewing the cause of the issue to

determine additional corrective actions.

The inspectors determined that the issue of concern represented a performance deficiency because it was the result of the licensee's failure to meet a regulatory requirement, and the cause was reasonably within the licensee's ability to foresee and correct and should have been prevented. Because the performance deficiency is considered to potentially impede or impact the ability of the NRC to perform its regulatory oversight function, the performance deficiency was dispositioned using the traditional enforcement process. Per NRC Enforcement Policy, Section 6.9.d.9, failing to make a report required by 10 CFR 50.72 is categorized as an example of a Severity Level IV violation. Additionally, because the violation was entered into the licensee's CAP, compliance was restored in a reasonable period of time, and was not repetitive or willful; this violation is being treated as a non cited SL IV violation, consistent with Section 2.3.2 of the NRC Enforcement Policy. Because the performance deficiency was not considered a finding using IMC 0612, Appendix B, "Issue Screening," and did not impact the Reactor Oversight Process Cornerstones of Safety, a cross cutting aspect was not assigned.

Inspection Report# : [2011005](#) (*pdf*)

Last modified : November 30, 2012