Appendix I

Operator Requalification
Human Performance
Significance Determination Process (SDP)

Introduction

The attached flowchart and matrix comprise the proposed process for determining the risk importance of issues identified during an inspection of the licensed operator re-qualification program or by a Resident Inspector's observation of re-qualification activities. This process covers only those issues related to the operator requalification program. It is the staff's current position that performance errors made by a licensed operator leading to, or during an actual operational event, are an integral part of the overall outcome of the event and would be reflected in the event risk determination or ultimately in a performance indicator. This position is being examined through a research project and an analysis of data in the Human Factors Information System.

Each issue should first be screened by using the Group 1, 2 and 3 questions of Inspection Manual Chapter 610*, Appendix B to determine whether it is a minor concern. At a minimum, Group 1 questions 2 and 3, Group 2 questions on Reactor Safety, and several of the Group 3 questions could be applicable to requalification issues.

This SDP starts when an operator requalification issue is identified and screened by a Regional Inspector based on IP 71111.11 and the sample of items selected or the licensee's test records, or by a Resident Inspector based on the IP 71111.11 Resident's Quarterly Review. It can be related to the programmatic aspects (e.g. exam grading, exam quality, exam security) or to the performance of licensed operators during the written exam or the annual operating test. This SDP is applicable to requalification issues related to all licensed operators, including both shift and staff crews, with either active or inactive licenses. The process is applicable to all license holders since a staff crew member could, at any time, be asked to go on-shift and because an inactive license holder needs only to spend the required time on-shift to activate a license. A crew is defined as any group of individuals evaluated as a single entity by the licensee on the basis of its performance on the dynamic simulator.

Simulator Operational Evaluation Matrix

The Simulator Operational Evaluation Matrix provides a guide to the perceived risk associated with the number of crews failing the annual operating test as related to the number of crews taking the test. The "Number of Crews that took the Annual Operating Test" includes multiple units in order to accommodate those instances where operators hold dual unit licenses. If a multiple unit site has separate unit licenses, the matrix should be used to assess the results at each of the units separately. The chart accommodates up to sixteen crews and eight UNSAT crews. If more crews are tested or are UNSAT in a particular cycle, the finding color can be determined by the percentages at the bottom of the chart. The information should be obtained by the Regional Inspector or Resident Inspector at the end of the testing cycle. Less than 20% failure rate is considered

satisfactory and therefore does not constitute a finding to be recorded in an inspection report. A failure rate of 20% to 34% is considered to be a green finding to be turned over to the licensee for corrective action. An operating test failure rate greater than 34% meets the NUREG-1021, Rev 8 criteria for an UNSAT Requalification Program and is considered to be a white finding up to 50%. Should more than half the crews fail, it is considered to be a serious programmatic weakness and a yellow finding. Requalification operating test failure rate alone is never considered to be a red finding unless over half the crews failed and one or more of the failed crews are returned to the shift without remediation. Use of this matrix is explained below in the description of the flow chart blocks.

The SDP Flow Chart

The Requalification SDP process starts with a single issue (Block #1) identified by the Regional or Resident inspectors during their conduct of Inspection Procedure 71111.11, "Licensed Operator Requalification Program." It includes issues identified by the Regional and Resident Inspectors on selected samples of data, from interviews, or analyses of the operating test results by Regional or Resident Inspectors at the end of the testing cycle. The process attempts to include only those aspects of the requalification program considered to be risk important. For example, the student feedback system in-and-of itself has little risk importance, but its review might lead the inspector to issues that are risk important. Issues screened out by the process should still be reported as observations if they are indicative of trends or significant extent of condition (See IMC 0610*, cross cutting issues).

The process first examines inspector issues related to the licensee's grading of the exam to ensure that failed candidates or crews are properly identified and not passed inappropriately. Once again, the risk importance is not that the licensee's grading process was inadequate or flawed, but that inadequately trained operators may be allowed to go on shift. The inadequacy of the grading process may turn out to be a contributing factor, but inadequate training is probably the root cause.

The next parts of the SDP process are related to the written and walkthrough portions of requalification (pages 1 and 2 of the flowchart), and address issues of exam quality and security and the performance of multiple individuals. The risk determination assumes that a single individual failure in requalification does not rise to the risk significance of a green finding. However, when multiple failures are considered, more than 20% has been selected as the threshold for an unacceptable number of failures. This is generally consistent with the guidance in the examination standards of NUREG-1021, Rev. 8. Thus, more than 20% unacceptable written test items is the quality threshold; more than 20% of the operators failing the written portion is the performance threshold; more than 20% of the operators failing the operating test walkthrough is the walkthrough performance threshold, etc.

The simulator portion of the SDP (pages 3 and 4 of the flowchart) evaluates scenario quality and security and performance of crews. Again, an individual failing in the simulator portion does not rise to the risk significance of a green finding. The risk significance of crew performance depends on the percentage of crews that have failed, whether they were remediated before returning to shift, and whether the facility had a failure rate of green or higher (as determined by the SDP Simulator Operational Evaluation Matrix) in the previous

annual operating test. The risk assessment of operator performance on the simulator should include all of the crews tested based on test records, even if the inspectors witnessed testing of only some of the crews.

Finally, the SDP looks at the overall requalification program by asking if less than 75% of the operators passed all portions of the exam (NUREG-1021, Rev. 8, ES 601), and if more than 20% of the operator licensing records have operationally risk important deficiencies.

Flowchart Block Descriptions

#1 - This SDP starts after a single operator requalification issue is identified and screened through Manual Chapter 0610*, Appendix E questions during an inspection of the licensed operator requalification program, by analysis of test records at the end of the cycle, or by a Resident Inspector's observation of requalification activities. Each specific issue must be evaluated separately. An issue can be related to the programmatic aspects (e.g. exam grading, exam quality, operator licensing records) or to the performance of licensed operators during the written or annual operating test.

#2 - Is the issue related to incorrect or inappropriate grading of the written exam or operating test by the licensee? This can be identified, for example, as a result of the inspector's observation of the operating test or an evaluation of the grading of a sample of the written exam.

#3 - Did the inspector's review of a sample of the written exam identify an issue with the grading that would have failed a candidate that the licensee's examiner passed? Did the inspector identify a crew or individual operator performance issue in the operating test that should have resulted in a failure, but was not identified by the licensee's examiner? These are considered risk important issues, since operators or crews with unsatisfactory evaluations could be placed on shift.

#4 - Is the issue related to written exam quality, security or operator performance in taking the exam? This issue may stem from student feedback or other personnel interviews as well as inspector observation or data analysis.

#5 - Is the issue related to the individual operating test (generally JPM) quality, security or operator performance in the walkthrough? This issue may stem from student feedback or other personnel interviews as well as inspector observation or data analysis.

#6 - Is the issue related to the physical or functional fidelity of the simulator as compared to the real plant? This issue may stem from student feedback or other personnel interviews, review of simulator performance tests, as well as inspector observation.

#7 - Is the issue related to the quality of the individual operating test? This issue may stem from student feedback or other personnel interviews as well as inspector observation or data analysis. Has the appropriate significant information from the feedback system been incorporated in the individual operating test?

#8 - Has security of the individual operating test content been compromised? This refers to a loss of control of the exam material such that exam validity is affected. Knowledge of

an exam security breach can occur through two principal means: (1) the inspector's direct knowledge and/or evidence or information that such a breach occurred and/or, (2) an analysis of operator post exam results suspected to have been influenced by a security breach or exposure that reveals that the exam results attained are not probable or likely given the history of the operator's past performance. The second method is possible, but not likely in the operating tests.

If the compromise was determined to be inadvertent and the test is rewritten prior to administration, it is not a risk important finding and the answer to this block is "no."

#9 - Have more than 20% of the operators who took the individual operating test in this training cycle failed? This should be determined by the Regional Inspector or by the Resident Inspector by examining the licensee's test records at the end of the cycle.

#10 - Were more than 20% of the individual operating test items reviewed by the inspector unacceptable? This is based on the sample selected by the inspector and the acceptance criteria established in NUREG-1021, Rev. 8, Appendix C, Form ES-C-2.

#11 - When the security compromise was discovered did the licensee take compensatory measures immediately? The risk importance increases if the test security was compromised, the individual returned to shift and compensatory actions were not taken immediately upon discovery.

#12 - Could deviations or differences between the plant control room and the plant reference simulator negatively impact operator actions? There will always be some physical or functional differences between the simulator and the control room, but the concern here is how they impact the operator. Could the differences result in negative training? ANSI/ANS-3.5-1993/1998, "Nuclear Power Plant Simulators for Use in Operator Training and Examination," Section 4.2.1.4, provides guidance in assessing the deviations.

#13 - Is the issue related to the quality (accuracy, clarity, appropriateness, discrimination, etc.) of the written exam? Has the appropriate significant information from the feedback system been incorporated in the written exam.

#14 - Has the security of the written exam content been compromised? This refers to a loss of control of the exam material such that the exam validity is affected. Knowledge of an exam security breach can occur through two principal means: (1) the inspector's direct knowledge and/or evidence or information that a breach occurred and/or, (2) an analysis of operator post exam results suspected to have been influenced by a security breach or exposure that reveal that the exam results attained are not probable or likely given the history of the operator's past performance.

If the compromise was determined to be inadvertent and the test is rewritten prior to administration, it is not a risk important finding and the answer to this block is "no."

#15 - Have more than 20% of the operators who took the written exam in this training cycle failed? This should be determined by the Regional Inspector or by the Resident Inspector by examining the licensee's test records at the end of the cycle.

#16 - Were more than 20% of the written questions reviewed by the inspector unacceptable? This is based on the sample selected by the inspector and the acceptance criteria established in NUREG-1021, Rev. 8, ES-602, Attachment 1 and Appendix B.

#17 - When the security compromise was discovered did the licensee take compensatory measures immediately? The risk importance increases if the test security was compromised, the individual returned to shift and compensatory actions were not taken immediately upon discovery.

#18 - (intentionally left blank)

#19 - (intentionally left blank)

#20 - Is the issue related to the qualitative (realism, event sequencing, difficulty, etc.) or quantitative (number of normal evolutions, malfunctions, transients, etc.) aspects of the scenario? Has the appropriate significant information from the feedback system been incorporated in the scenarios?

#21 - Has security of the scenario been compromised? This refers to loss of control of the scenario identity or material such the operating test validity is affected. Knowledge of a scenario security breach can occur through two principal means: (1) the inspector's direct knowledge and/or evidence or information that a breach occurred and/or, (2) an analysis of operator or crew post test results suspected to have been influenced by a security breach or exposure, that reveal that the operating test results attained are not probable or likely given the history of the operator's or crew's past performance. The second method is possible, but not likely in the operating tests.

If the compromise was determined to be inadvertent and the scenario was rewritten or another selected prior to administration, it is not a risk important finding and the answer to this block is "no."

#22 - Is the issue related to crew performance on the dynamic simulator operating test? Crew performance is a demonstration of the ability to effectively operate as a team while completing a series of critical tasks that measure the crews ability to safely operate the plant during normal, abnormal, and emergency situations. The facility licensee will conduct its annual operator performance evaluations in accordance with the requirements of its requalification program. If the licensee chooses to fail crews based on poor performance related to administrative tasks in addition to simulator critical tasks then they will count as failures in this SDP, unless the licensee specifically records these as administrative failures for remediation purposes.

#23 - Based on the licensee's records, did less than 75% of the operators in this training cycle pass all portions of the exam? If so, it may be indicative of an unsatisfactory requalification program (Reference NUREG-1021, Rev. 8, ES-601, E.3.a.(1)). This information should be determined by the Regional Inspector or by the Resident Inspector by examining the licensee's test records at the end of the cycle.

#24 - Is the issue related to the licensee's program for maintaining active operator licenses and ensuring the medical fitness of its licensed operators?

#25 - Were more than 20% of the scenarios in the sample reviewed by the inspector unacceptable based on the qualitative and quantitative criteria of NUREG-1021, Rev. 8, Appendix D and the "Simulator Scenario Review Checklist," (Form ES-604-1)?

#26 - When the security compromise was discovered did the licensee take immediate compensatory measures? The risk importance increases if the operating test was compromised, individuals or crew returned to shift and compensatory actions were not taken immediately upon discovery.

27 - Based on the sample selected by the inspector, did more than 20% of the records indicate deficiencies that could pose a potential risk to operations, as described in IP 71111.11, Section 03.08? For example, are crew members maintaining active licenses and are their qualifications current? Is the licensee complying with special license conditions for medical limitations, notification of medical restrictions as required by 10 CFR 50.74(c) and are physical examinations up to date? Based on the judgement of the inspector, administrative errors in the records, having no bearing on operational safety, should not be considered as issues to be entered into the SDP.

#28 - (intentionally left blank)

#29 - (intentionally left blank)

#30 - Was the simulator operating test crew failure rate for the entire cycle greater than 50% (Yellow on matrix)? This information should be determined by the Regional Inspector or by the Resident Inspector by examining the licensee's test records at the end of the cycle.

#31 - Were the failed crews (50% or less of total number of crews) remediated and completely re-tested successfully before they were returned to shift? Even a single failed crew returning to shift is a potential risk and is considered to be at least a White Finding.

#32 - Were the failed crews (greater than 50% of total number of crews) remediated and re-tested successfully before they were returned to shift? If "yes" this remains a Yellow Finding for the shear magnitude of the programmatic problem. If "no" it is an even more serious problem (Red Finding) and deserves significant NRC attention.

#33 - Was the operating test failure rate less than 20%, or between 34% and 50%? Less than 20% failure rate and the failed crews satisfactorily remediated before returning to shift remains a No Finding. Failure rate between 34% and 50% and the failed crews satisfactorily remediated before returning to shift remains a White Finding because it still indicates an UNSAT Requalification Program as defined by NUREG-1021, Rev. 8, ES-601, E.3.a.(2).

#34 - If the failure rate in the current operating test cycle is between 20% and 34% (Green Finding) and it was green or higher in the last operating test cycle, the concern is that this is a repeat issue, a potential weakness in the SAT process, and corrective actions are not working satisfactorily. Thus, the issue is escalated to a White Finding. If the failure rate in the current operating test cycle is white or higher, and it was green or higher in the last cycle, further escalation is unnecessary, and the current color remains.

Simulator Operational Evaluation

September 21, 2000

Number of Crews
with
UNSAT Performance in the
Annual Operating Test

Number of Crews that took the Annual Operating Test (Includes Dual Units)

	1	2	3	4	5	6	7	8
4	G	W	Y	Y	NA	NA	NA	NA
5	G	W	Y	Y	Y	NA	NA	NA
6	NF	G	W	Y	Y	Y	NA	NA
7	NF	G	W	Y	Y	Y	Y	NA
8	NF	G	W	W	Y	Y	Y	Y
9	NF	G	G	W	Y	Y	Y	Y
10	NF	G	G	W	W	Y	Y	Y
11	NF	NF	G	W	W	Y	Y	Y
12	NF	NF	G	G	W	W	Y	Y
13	NF	NF	G	G	W	W	Y	Y
14	NF	NF	G	G	W	W	W	Y
15	NF	NF	G	G	G	W	W	Y
16	NF	NF	NF	G	G	W	W	W

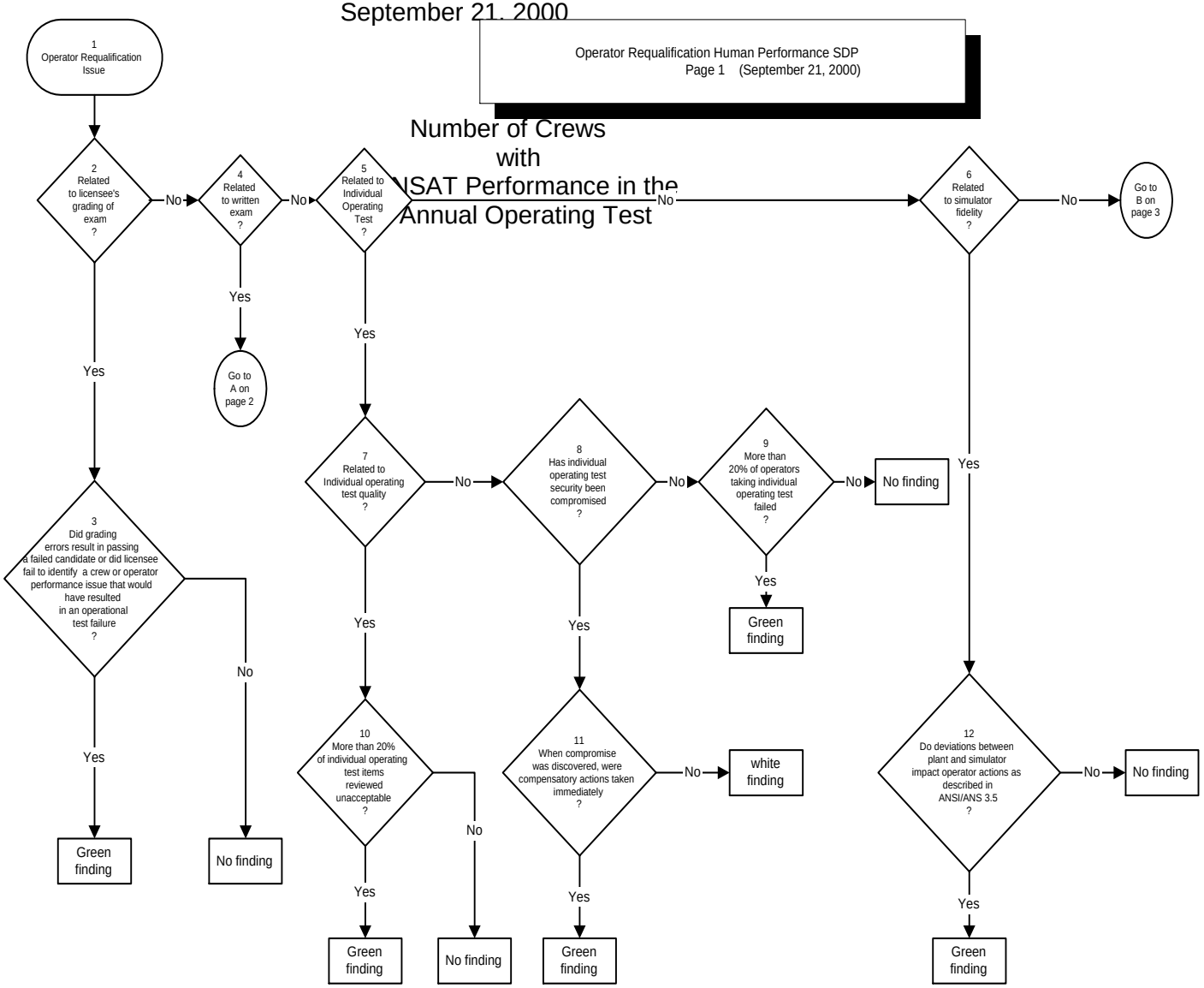
NF = < 20% Failure Rate - No Finding
G = 20 - 34% Failure Rate
W = >34 - 50% Failure Rate (NUREG-1021, Rev 8 - UNSAT Requalification Program)
Y = >50% Failure Rate
NA = Not Applicable

Simulator Operational Evaluation

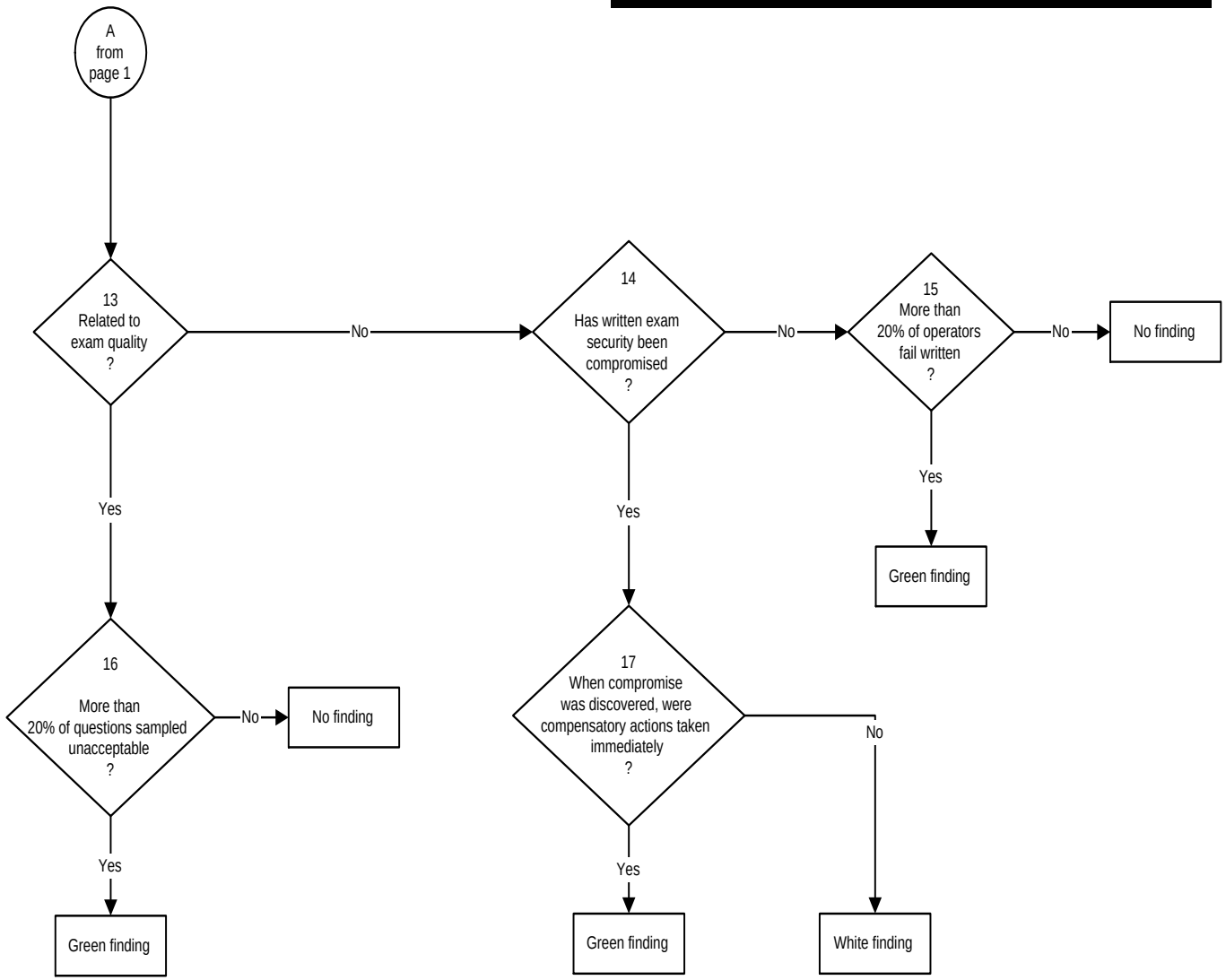
September 21, 2000

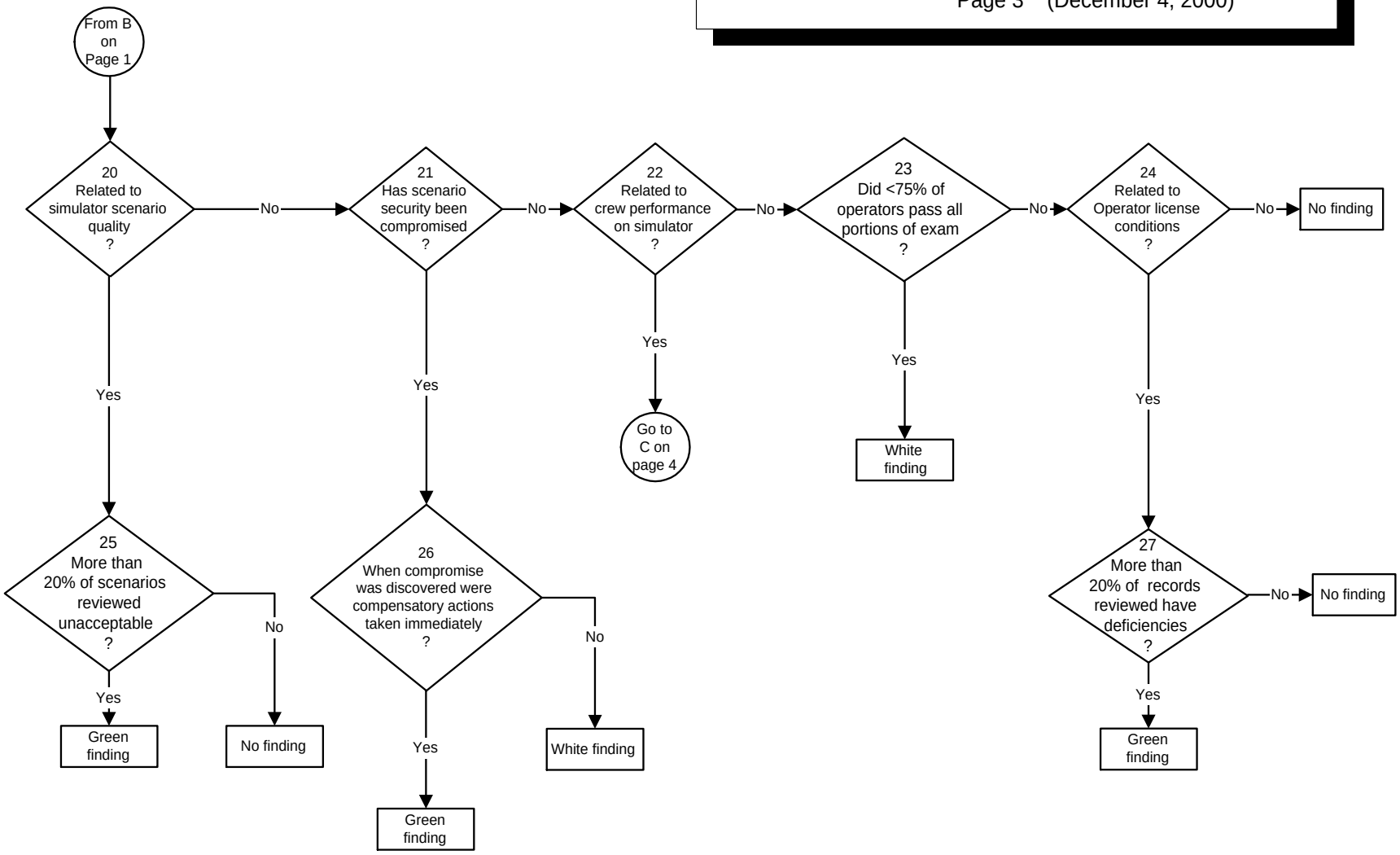
Operator Requalification Human Performance SDP
Page 1 (September 21, 2000)

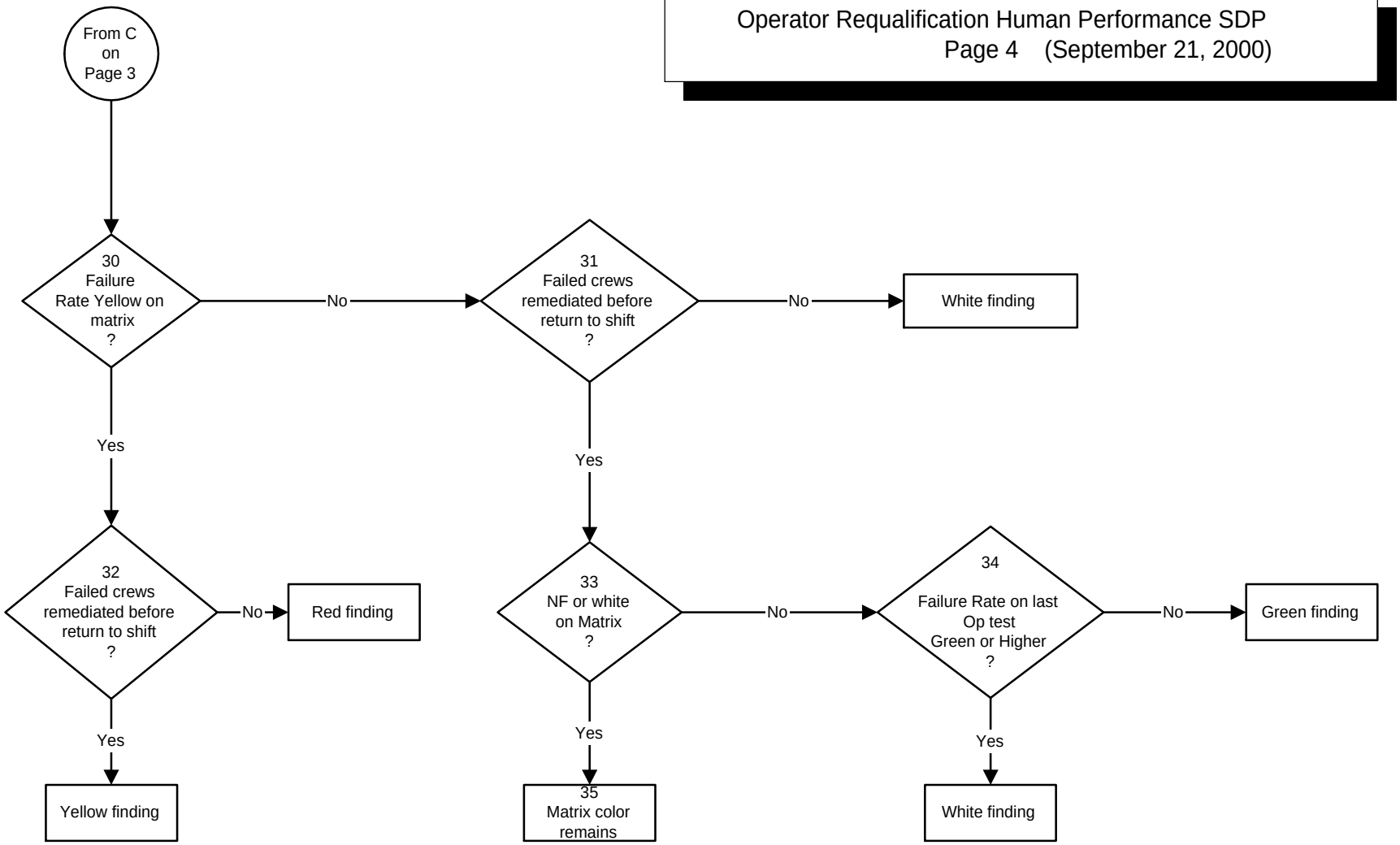
Number of Crews with UNSAT Performance in the Annual Operating Test



Note: If more than 16 crews are tested, or more than 8 crews are UNSAT in a given cycle, use the percentages above to determine the appropriate color.


A
from
page 1
13
Related to
exam quality
?
No
14
Has written exam
security been
compromised
?
No
15
More than
20% of operators
fail written
?
No
No finding
Yes
Green finding
Yes
Yes
16
More than
20% of questions sampled
unacceptable
?
No
No finding
17
When compromise
was discovered, were
compensatory actions taken
immediately
?
No
Yes
Green finding
Yes
Green finding
White finding


From B on Page 1
20 Related to simulator scenario quality ?
No
21 Has scenario security been compromised ?
No
22 Related to crew performance on simulator ?
No
23 Did <75% of operators pass all portions of exam ?
No
24 Related to Operator license conditions ?
No
No finding
Yes
Yes
Yes
Yes
Yes
Go to C on page 4
White finding
25 More than 20% of scenarios reviewed unacceptable ?
No
Yes
Green finding
No finding
26 When compromise was discovered were compensatory actions taken immediately ?
No
Yes
White finding
Green finding
27 More than 20% of records reviewed have deficiencies ?
No
No finding
Yes
Green finding


From C on Page 3
30 Failure Rate Yellow on matrix ?
No
31 Failed crews remediated before return to shift ?
No
White finding
Yes
Yes
32 Failed crews remediated before return to shift ?
No
Red finding
33 NF or white on Matrix ?
No
34 Failure Rate on last Op test Green or Higher ?
No
Green finding
Yes
Yes
Yes
Yellow finding
35 Matrix color remains
White finding