

proposed rule did not require exposure monitoring in the construction and maritime sectors. In light of comments, OSHA has shifted from this approach to requiring all sectors to conduct exposure monitoring, but allowing a performance-oriented option to exposure monitoring.

Timing of the Standard: The SBREFA Panel also recommended considering a multi-year phase-in of the standard. OSHA has solicited comment and examined the comments on this issue. OSHA has decided to allow employers

four years (rather than two years) to comply with the engineering control provisions of the standard. This expanded phase-in of engineering controls has several advantages from a viewpoint of impacts on small businesses. First, it reduces the one-time initial costs of the standard by spreading them out over time. This would be particularly useful for small businesses that have trouble borrowing large amounts of capital in a single year. A phase-in is also useful in the electroplating sector by allowing

employers to coordinate their environmental and occupational safety and health control strategies to minimize potential costs. See the Summary and Explanation section of this Preamble for further discussion of this issue.

SBREFA Panel

Table VIII-14 lists all of the SBREFA Panel recommendations and notes OSHA responses to these recommendations.

Table VIII-14. SBREFA Panel Recommendations and OSHA Responses

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that, as time permits, OSHA revise its economic and regulatory flexibility analyses as appropriate to reflect the Small Entity Representative (SER) comments on underestimation of costs and that the Agency compare the OSHA revised estimates to alternative estimates provided and methodologies suggested by the SERs. For those SER estimates and methodological suggestions that OSHA does not adopt, the Panel recommends that OSHA explain its reasons for preferring an alternative estimate and solicit comment on the issue.</p>	<p>OSHA extensively reviewed its cost estimates, and changed many of them in response to SER comments and solicited comments on these revised cost estimates. A few examples of OSHA's cost changes are given in the responses to specific issues, below (e.g., medical exams, training and familiarization).</p> <p>As a result of comments on the proposed rule, OSHA has further increased its costs to reflect a variety of issues.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that, to the extent time permits, OSHA should carefully consider the ability of each potentially affected industry to meet any proposed PEL for Cr(VI) and solicit comment on the costs and technological feasibility of the PEL.</p>	<p>The FEA reflects OSHA's judgment on technological feasibility and includes responses to specific issues raised by the Panel and SERs. OSHA solicited comment on the accuracy and reasonableness of these judgments, and has significantly altered both its cost and technological feasibility assessments in light of these comments.</p>
<p>The Panel recommends that OSHA carefully review the basis for its estimated medical surveillance compliance costs, consider these concerns raised by the SERs, and ensure that its estimates are revised, as appropriate and time permits, to fully reflect the costs likely to be incurred by potentially affected establishments.</p>	<p>OSHA has increased the estimated time for a limited medical exam from 1.5 hours to 3 hours and solicited comment on all other cost projections for medical surveillance. See Chapter IV OF THE FEA; COSTS OF COMPLIANCE, COSTS BY PROVISION - <u>Medical Surveillance</u>, for details of OSHA's unit costs for medical surveillance.</p>
<p>The Panel recommends that, as time permits, OSHA consider alternatives that would alleviate the need for extensive monitoring on construction sites, and solicit comment on this issue. If OSHA does not adopt such alternatives, then OSHA should consider increasing the estimated costs of such monitoring in construction, and solicit comment on the costs of monitoring.</p>	<p>OSHA revised the standard to allow all sectors to develop performance oriented approaches to exposure assessment; for all sectors, OSHA believes that its unit cost estimates are realistic in light of the comments OSHA received. See Chapter IV OF THE FEA: COSTS OF COMPLIANCE, COSTS BY PROVISION - <u>Exposure Monitoring (Initial and Periodic)</u>, for details of OSHA's unit costs for exposure monitoring in general industry.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA carefully review the basis for its estimated hygiene compliance costs, consider the concerns raised by the SERs, and, to the extent time permits, ensure that its estimates are revised, as appropriate, to fully reflect the costs likely to be incurred by potentially affected establishments.</p>	<p>OSHA's proposed standard allowed hand washing as a hygiene option; OSHA has eliminated the requirement for special wording for labels of contaminated clothing, thus reducing any cost premium related to handling contaminated waste water or laundry.</p>
<p>The Panel recommends that OSHA examine and solicit comment on possible underestimates of the costs of regulated areas.</p>	<p>In the proposed rule, OSHA recognized costs for training and familiarization to cover a better understanding of the costs of regulated areas, and solicited comment on the issue. See Chapter IV OF THE FEA; COSTS OF COMPLIANCE, COSTS BY PROVISION - <u>Communication of Hazards to Employees - Training and Familiarization</u>, for details of OSHA's unit costs for this provision, public comments and responses to these comments.</p>
<p>The Panel recommends that OSHA examine and solicit comment on the costs of laundering PPE.</p>	<p>See above—OSHA has eliminated the labeling requirement for contaminated PPE, and thus reduced any premium of costs for labeled PPE. See Chapter IV OF THE FEA; COSTS OF COMPLIANCE, COSTS BY PROVISIONS - <u>Housekeeping, Protective Work Clothing and Equipments</u>, and Table IV-8 for details of OSHA's unit costs for laundering PPE and other related costs.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA examine whether its cost estimates reflect the full costs of complying with the hazard communication standard.</p>	<p>OSHA's analysis assumes that employers will need time for familiarization with the standard, training on the standard, and increased initial supervision.</p>
<p>The Panel recommends that OSHA thoroughly review the economic impacts of compliance with a proposed Cr(VI) standard and develop more detailed feasibility analyses where appropriate. The Panel also recommends that OSHA, to the extent permitted by time and the availability of economic data, reexamine its estimates of profits and revenues in light of SER comments, and update economic data to better reflect recent changes in the economic status of the affected industries, consistent with its statutory mandate. The Panel also recommends that OSHA examine, to the extent feasible with the time available, the possibility that users will substitute non-Cr(VI) products for Cr(VI) products. The Panel recommends that OSHA solicit comment on the extent to which foreign competition may or may not impact what is feasible for the industries affected by this rule.</p>	<p>OSHA reviewed and revised many of its revenue and profit estimates in the light of specific SER comments. Examples of application groups with revised revenue and profit estimates include Group 4, Chromate Production; Group 5, Chromate Pigment Producers; and Group 17, Chromium Dye Producers. For the final rule, OSHA has updated revenue and profit impacts across the board To the most recent year fully available - 2002.</p>

Table VIII-14, contd. SBREFA Panel Recommendations and OSHA Responses

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA consider and solicit comments on selective exemption of some industries from the proposed standard, especially those industries whose inclusion is not supported by the industry-specific data or in which inhalation exposure to Cr(VI) is minimal.</p>	<p>OSHA is reluctant to exempt industries where exposures are minimal because changes in technology could change exposures in the future. However, OSHA has allowed industries to exempt themselves from the rule based on data demonstrating that exposure levels can be expected to be less than 0.5 as an 8-hour TWA.</p>
<p>The Panel recommends that OSHA exempt applicators of CCA given that they are already regulated by EPA as pesticide applicators under FIFRA. In addition, OSHA should clarify and seek comment as to why users of CCA-treated wood should be covered under the Cr(VI) proposal given that the use of CCA-treated wood was previously excluded by OSHA in its standard for inorganic arsenic.</p>	<p>OSHA has decided to exempt applicators of CCA in this rule.</p>
<p>The Panel recommends that OSHA clearly explain the way that Cr(VI) exposure and risk for the worker cohort studies used in the quantitative risk assessment were calculated, and should consider and seek comment as to whether the major assumptions used in these calculations are reasonable.</p>	<p>The Quantitative Risk Assessment section of the Preamble addresses this issue, and the comments OSHA received on it.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA consider the available information on reduction of inhaled Cr(VI) to Cr(III) in the body, to determine whether exposures below a threshold concentration can be shown not to cause the genetic alterations that are believed to cause cancer. In addition, OSHA should review epidemiological analyses relevant to the question of threshold dose, to determine whether such a dose is identifiable from the available human data. OSHA should further consider and seek comment on these findings in relation to the risk assessment and the proposed PEL, allowing for a higher PEL than those presented in the draft standard if the risk assessment so indicates.</p>	<p>The Quantitative Risk Assessment of this Preamble addresses the issue of possible threshold effects and comments OSHA received on this issue.</p>
<p>The Panel recommends that OSHA should clarify the meaning of the projected lung cancer risk estimates used to support the proposed standard. In particular, OSHA should explain these estimates, which are based on a working lifetime of 45 years' exposure at the highest allowable Cr(VI) concentration, and, where appropriate, note projected excess cancers that may result from shorter periods of occupational Cr(VI) exposure.</p>	<p>OSHA is required by law to set health standards so that they avoid significant risk over a working lifetime. Both in the QRA and in the Benefits Chapter of the FEA, OSHA has examined alternative exposure scenarios. See VI. Quantitative Risk Assessment in the Preamble and Chapter VI of the FEA; BENEFITS and NET BENEFITS, Lung Cancers Avoided in this FEA.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA solicit information to better characterize the exposure patterns and Cr(VI) compounds encountered in the maritime environment, and should encourage input from marine chemists at appropriate points in the rulemaking.</p>	<p>OSHA has added information provided by firms in the shipyard industry since the Panel meeting. (See Chapter II of the FEA; PROFILE OF AFFECTED INDUSTRIES, PROCESSES, AND APPLICATIONS GROUPS, AFFECTED INDUSTRIES - <u>Welding</u> and <u>Painting</u> and Chapter III: Technological Feasibility, <u>Welding</u> and <u>Painting</u>). OSHA solicited comment on shipyard issues and from maritime chemists, and has modified its estimates in light of the data received.</p>
<p>The Panel recommends that OSHA consider the appropriateness of separate PELs for specific Cr(VI) compounds, with attention to the weight and extent of the best available scientific evidence regarding their relative carcinogenic potency.</p>	<p>OSHA considered this possibility and decided against it, in part, because it would require lower PELs and result in many persons in respirators. OSHA solicited comment on this issue, and responded to these comments in the technological feasibility section and in Summary and Explanation for the Rule.</p>
<p>The Panel recommends that OSHA solicit information to better define construction activities likely to be above and below the PEL (for initial exposure monitoring purposes) to minimize the amount of respiratory protection that would need to be used for compliance.</p>	<p>OSHA has set forth a rule that allows a performance-oriented approach to monitoring in all sectors. OSHA considered a control banding approach to construction, but lacked the data to fully implement this approach, even after soliciting comment on the issue.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA provide a better explanation of how to implement an exposure assessment program for construction activities. Also, OSHA should provide further explanation on monitoring-related topics like the selection of sampling and analytical methods, the selection of plus-or-minus 25 percent as a confidence interval, and the use of objective data in lieu of monitoring.</p>	<p>OSHA has decided to allow a performance-oriented approach to exposure monitoring in all sectors. The monitoring-related topics are further discussed in the Preamble, XVII. Summary and Explanation of the Standard.</p>
<p>The Panel recommends that OSHA consider less frequent monitoring for exposures above the PEL, especially in situations where the employer has already engineered down to the lowest feasible level and is not able to maintain levels below the PEL.</p>	<p>OSHA has left the monitoring frequency unchanged, but has developed a performance-oriented alternative to scheduled monitoring.</p>
<p>The Panel recommends that OSHA review the technologies used to reduce Cr(VI) exposure to ensure that they are available or reasonably anticipated to be available in the future.</p>	<p>OSHA reviewed its technological feasibility analysis and solicited comment on it. In light of these comments, OSHA has changed the PEL based on technological feasibility considerations.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA clarify the purpose of the prohibition on the use of employee rotation to meet the PEL and take into account the needs expressed by the SERs on the issue.</p> <p>The Panel recommends that OSHA clarify the methods of compliance section.</p>	<p>The Summary and Explanation of the Preamble explains further the prohibition on employee rotation and the methods of compliance.</p>
<p>The Panel recommends that OSHA clarify how to implement the use of regulated areas particularly for construction activities. OSHA should better explain how employers would delineate boundaries for regulated areas and should better clarify the use of respiratory protection, personal protective clothing and equipment, and hygiene facilities and practices in regulated areas.</p>	<p>OSHA has eliminated the requirement for regulated areas in construction and shipyards. The Summary and Explanation section of the Preamble explains the regulated area requirements in General Industry.</p>
<p>The Panel recommends that OSHA provide a clearer explanation of why it is necessary to remove Cr(VI)-contaminated protective clothing and wash hands prior to entering non-Cr(VI) work areas and eating, drinking or smoking and take into account lost time and costs associated with conducting such activities.</p> <p>The Panel recommends that OSHA clarify its definition of contaminated clothing or waste, provide evidence supporting the view that "contaminated" clothing presents a hazard, and better</p>	<p>These issues are addressed in the Summary and Explanation section of the Preamble.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>explain the special treatment of such items and why the treatment is necessary.</p>	
<p>The Panel recommends that OSHA clarify its definition of reasonably anticipated skin and eye contact.</p> <p>The Panel recommends that OSHA clarify the circumstances under which the proposed rule would require the use of personal protective equipment to prevent dermal exposures to solutions containing Cr(VI). In particular, OSHA should reconsider the requirements for the use of dermal protection when the PEL is exceeded; consider alternatives that are more clearly risk based; and determine whether the use of very dilute Cr(VI) solutions, as used in some laboratories, requires the use of personal protective equipment.</p>	<p>OSHA has changed the rule from the SBREFA draft in order to clarify when PPE is required and to assure that it is not required except where a dermal hazard exists.</p>
<p>The Panel recommends that OSHA provide a clearer explanation of the benefits and the need for its proposed medical surveillance provisions.</p> <p>The Panel recommends that OSHA provide clearer guidance as to which employees are intended to be covered under the medical surveillance provisions and, in particular, how the standard is intended to cover employees who work for</p>	<p>OSHA has maintained routine medical surveillance in the shipyard and construction industries. The Preamble Summary and Explanation section clarifies what is required of medical surveillance, and the extent to which the same medical examination can be used to meet the requirements of different standards.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>several different employers during the course of a year.</p> <p>The Panel recommends that OSHA clarify the qualifications necessary to provide a medical examination (including what knowledge of Cr(VI) is necessary) and what the elements of such a medical examination should be.</p> <p>The Panel recommends that OSHA design the medical surveillance provisions to be consistent with existing OSHA standards (e.g., lead and arsenic) wherever possible, in order to minimize the need for duplicative medical examinations. The Panel also recommends that OSHA clarify that differences in medical surveillance requirements that may be unavoidable across OSHA standards nevertheless often will not require completely separate medical examinations.</p>	
<p>With respect to the EPA electroplating standards, the Panel recommends that OSHA examine whether important costs have been omitted, seek to develop alternatives that minimize these costs, and seek comment on the issue.</p> <p>With respect to possible dual jurisdiction with FIFRA, the</p>	<p>OSHA discusses the impact of EPA's electroplating standard in the FEA, (See Chapter III: Technological Feasibility, Electroplating, Chapter IV: Costs of Compliance, and Chapter VIII: Environmental Impacts) and sought comments on this issue. In light of these comments, OSHA significantly increased its estimated costs for the electroplating application group.</p>

**Table VIII-14, contd. SBREFA Panel Recommendations and
OSHA Responses**

SBREFA Panel Recommendation	OSHA Response
<p>Panel recommends that OSHA consider dropping CCA applicators from the scope of the rule, and seek comment on this issue.</p> <p>With respect to the issue of using OSHA PELs as a basis for fence line standards, the Panel recommends that OSHA make clear the purpose of its PELs, and explain that they are not developed or examined in terms of their validity as a basis for air quality standards.</p>	<p>OSHA has decided to exclude CCA applicators from the scope of the standard.</p> <p>OSHA solicited comment on the "fence line" standard issue, but received no evidence that any state sets "fence line" standards in a way dependent on OSHA PELs.</p>
<p>The Panel recommends that OSHA examine whether existing standards are adequate to cover occupational exposure to Cr(VI), and, if not, develop the Cr(VI) standard in such a way as to eliminate duplicative and overlapping efforts on the part of employers.</p>	<p>OSHA has determined that, except for CCA applicators and cement workers, other standards cannot provide the worker protection needed, but has sought to avoid duplication of effort between standards.</p>
<p>The Panel recommends that OSHA consider the scientific evidence in favor of a higher PEL, analyze the costs and economic impacts of a PEL of 20 or greater, and solicit comment on this option.</p>	<p>OSHA has included an analysis of the scientific evidence in the health Effects and Quantitative Risk Assessment section of this Preamble, summarizes the costs and benefits, of a PEL of 20 in this Preamble summary, and has a full analysis of the costs, benefits and impacts of this option in the FEA.</p>

Table VIII-14, contd. SBREFA Panel Recommendations and OSHA Responses

SBREFA Panel Recommendation	OSHA Response
The Panel recommends that OSHA carefully examine the entire issue of intermittent exposures, consider options that can alleviate the burden on such firms while meeting the requirements of the OSH Act, and solicit comment on such options.	OSHA determined that intermittent users need not use engineering controls to assure compliance with the PEL.
Some SERs argued that some Cr(VI) compounds offer lesser risks of cancer than others, and should be subject to different PELs. The Panel recommends that OSHA consider these arguments and seek comment on the issue.	OSHA had preliminarily determined that all Cr(VI) compounds should have the same PEL, but sought comment on the issue. In response to comments (summarized in the Health Effects section of this preamble), OSHA decided that the final rule applies to Cr(VI) in all forms and compounds except exposures that occur in pesticide application, exposures to portland cement, and situations where objective data demonstrate that materials or a process, operation, or activity involving chromium cannot release dusts, fumes, or mists in concentrations at or above 0.5 $\mu\text{g}/\text{m}^3$ under expected conditions of use.

Table VIII-14, contd. SBREFA Panel Recommendations and OSHA Responses

SBREFA Panel Recommendation	OSHA Response
<p>The Panel recommends that OSHA continue to exempt wet cement from the scope of the standard, and that if OSHA seeks comment on this option, OSHA should note the Panel's recommendation and the reasons for the recommendation. The Panel also recommends that OSHA seek ways of adapting the standard better to the dynamic working conditions of the construction industry, examine the extent to which Cr(VI) exposures are already covered by other standards, and seek comment on these issues. The Panel also recommends that OSHA consider the alternative of developing a construction standard in a separate rulemaking.</p>	<p>OSHA has determined to exempt all cement exposure from the scope of the standard.</p> <p>OSHA made a number of changes to the construction standard in the final rule, including allowing a performance oriented approach to exposure assessment, and eliminating the regulated area requirement and the action level.</p>
<p>The Panel recommends that OSHA consider, and solicit comment on, approaches to their special problems; that OSHA consider the possibility of making the maritime proposed standard more similar to the construction draft standard, or consider the alternative of developing a maritime standard in a separate rulemaking.</p>	<p>OSHA has made a number of changes to the shipyard standard in the final rule, including allowing a performance-oriented approach to exposure assessment and eliminating the regulated area requirement.</p>
<p>The Panel recommends that OSHA consider and seek comment on multi-year phase-in alternatives.</p>	<p>OSHA has chosen to allow all firms four years before they need to implement engineering controls to meet the standard.</p>

Table VIII-14, contd. SBREFA Panel Recommendations and OSHA Responses

SBREFA Panel Recommendation	OSHA Response
The Panel recommends that OSHA better explain the action level, including its role in ensuring workers are protected.	OSHA has included an action level in the general industry, construction, and shipyard standards and explains its role in the general industry standard in the Summary and Explanation section of the Preamble.
The Panel recommends that OSHA consider the use of SECALs and solicit comment on whether and in what industries they are appropriate using the Cadmium standard as a model.	OSHA has allowed a SECAL for certain aerospace painting applications.

BILLING CODE 5410-26-C*H. Need for Regulation*

Employees in work environments addressed by the final standards are exposed to a variety of significant hazards that can and do cause serious injury and death. The risks to employees are excessively large due to the existence of market failures, and existing and alternative methods of alleviating these negative consequences have been shown to be insufficient. After carefully weighing the various potential advantages and disadvantages of using a regulatory approach to improve upon the current situation, OSHA concludes that in this case the final mandatory standards represent the best choice for reducing the risks to employees. In addition, rulemaking is necessary in this case in order to replace older existing standards with updated, clear, and consistent health standards.

IX. OMB Review Under the Paperwork Reduction Act of 1995

The final Cr(VI) rule contains collection of information (paperwork) requirements that are subject to review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (PRA-95), 44 U.S.C. 3501 *et seq.*, and OMB's regulations at 5 CFR part 1320. The Paperwork Reduction Act defines "collection of information" as "the obtaining, causing to be obtained, soliciting, or requiring the disclosure to

third parties or the public of facts or opinions by or for an agency regardless of form or format * * *" (44 U.S.C. 3502(3)(A)). The collection of information requirements (paperwork) associated with the proposed Cr(VI) rule were submitted to OMB on October 1, 2004. On November 30, 2004 OMB did not approve the Cr(VI) paperwork requirements, and instructed OSHA to examine "public comment in response to the NPRM, including paperwork requirements," and address any public comments on the paperwork in the preamble. OMB assigned the control number 1218-0252 for the Agency to use in future submissions.

The major information collection requirements in the Standard include conducting employee exposure assessment (§§ 1910.1026 (d)(1)-(3), 1915.1026 (d)(1)-(3), and 1926.1126 (d)(1)-(3)), notifying employees of their Cr(VI) exposures when employee exposures exceed the PEL (§§ 1910.1026 (d)(4), 1915.1026 (d)(4), and 1926.1126 (d)(4)), providing respiratory protection (§§ 1910.1026 (g), 1915.1026 (f), and 1926.1126 (f)), labeling bags or containers of contaminated protective clothing or equipment (§§ 1910.1026 (h)(2), 1915.1026 (g)(2), and 1926.1126 (g)(2)), informing persons who launder or cleans protective clothing or equipment contaminated with Cr(VI) of the potential harmful effects (§§ 1910.1026 (h)(3), 1915.1026 (g)(3), and 1926.1126 (g)(3)), implementing medical-surveillance of employees

(§§ 1910.1026 (k), 1915.1026 (i), and 1926.1126 (i)), providing physician or other licensed health care professional (PLHCP) with information (§§ 1910.1026 (k)(4), 1915.1026 (i)(4), and 1926.1126 (i)(4)), ensuring that employees receive a copy of their medical-surveillance results (§§ 1910.1026 (k)(5), 1915.1026 (i)(5), and 1926.1126 (i)(5)), maintaining employees' exposure-monitoring and medical-surveillance records for specific periods, and maintaining historical monitoring and objective data (§§ 1910.1026 (m), 1915.1026 (k), and 1926.1126 (k)). The collection of information requirements in the rule are needed to assist employers in identifying and controlling exposures to Cr(VI) in the workplace, and to address Cr(VI)-related adverse health effects. OSHA will also use records developed in response to this standard to determine compliance.

The final rule imposes new information collection requirements for purposes of the PRA. In response to comments on the proposed rule, OSHA has revised provisions of the final rule that affect collection of information requirements. These revisions include:

- The final rule exempts exposures to portland cement in general industry and shipyards;
- An exemption is included in the final rule where the employer can demonstrate that Cr(VI) exposures will not exceed 0.5 µg/m³ under any expected conditions;