

<p>met - compliance monitoring - and that the assumptions made during the permit review and site selection process were correct and sufficient to protect the environment and human health - field monitoring. It is essential that such monitoring programmes have clearly defined objectives.</p>		<p>are met - compliance monitoring - and that the assumptions made during the permit review and site selection process were correct and sufficient to protect the environment and human health - field monitoring. Monitoring also allows for effective management of disposal sites, and allows for management if it is found that permit assumptions were incorrect. It is essential that such monitoring programmes have clearly defined objectives and are linked to environmental management plans in order to mitigate possible effect of injection activity and storage.</p>	<p>8 監視</p> <p>8.1 監視は、許可条件が満たされていること（遵守に関する監視）並びに許可評価及び処分場所の選択過程の間になされた資料が環境及び人の健康を保護するために正確かつ十分であったこと（現場における監視）を要証するために行われる。また、監視は処分場所の効果的管理を可能にし、許可の前提条件が満たされていないと判明した場合の管理を可能にする。当該監視計画が目的を明確に特定していること及び注入行為及び貯留により起こりうる影響を緩和するための環境管理計画と関連付けることは重要である。</p>
<p>met - compliance monitoring - and that the assumptions made during the permit review and site selection process were correct and sufficient to protect the environment and human health - field monitoring. It is essential that such monitoring programmes have clearly defined objectives.</p>	<p>42 It may usually be assumed that suitable specifications of existing (pre-disposal) conditions in the receiving area are already contained in the application for dumping. If the specification of such conditions is inadequate to permit the formulation of an Impact Hypothesis, additional information will be required by the licensing authority before any final decision on the permit application is made. (注：CO2WAG では、パラ 41 と 42 の順序が逆となっていた)</p>	<p>8.3 It may usually be assumed that suitable specifications of existing (pre-disposal) conditions in the receiving area are already contained in the application for dumping. If the specification of such conditions is inadequate to permit the formulation of an Impact Hypothesis, additional information will be required by the licensing authority before any final decision on the permit application is made. For disposal of carbon dioxide in sub-sea geological structures, baseline information is required from which changes that arise due to the disposal of carbon dioxide can be measured. (EDITORIAL NOTE: This section may be more appropriate in section 6)</p>	<p>8.2 注入率、注入圧、機械的完全性、及び二酸化炭素の性質が事業企画書及び許可要件に記載されているものと同様であることを確認するため、遵守に関する監視が実施されるべきである。</p> <p>8.3 投資申請書には、通常は、海域の現状（処分前）に関する適切な記述があらかじめ明示されていることが望ましい。係る現状の記述が、影響仮説を策定するために不十分ならば、許可申請に対する最終決定がなされる前に許可当局により追加的情報が要求される。海底下地質構造への二酸化炭素流処分については、二酸化炭素処分に起因する変化を測定する基準となるベースライン情報が要求される。（補足注：本項は、9 章に記載するほうが適切かもしれない。）</p>
<p>41 The Impact Hypothesis forms the basis for defining field monitoring. The measurement programme should be designed to ascertain that changes in the receiving environment are within those predicted. The following questions must be answered:</p> <ol style="list-style-type: none"> 1. What testable hypotheses can be derived from the Impact Hypothesis? 2. What measurements (type, location, frequency, performance requirements) are required to test these hypotheses? 3. How should the data be managed and interpreted? 	<p>41 The Impact Hypothesis forms the basis for defining field monitoring. The measurement programme should be designed to ascertain that changes in the receiving environment are within those predicted. The following questions must be answered:</p> <ol style="list-style-type: none"> 1. What testable hypotheses can be derived from the Impact Hypothesis? 2. What measurements (type, location, frequency, performance requirements) are required to test these hypotheses? 3. How should the data be managed and interpreted? 	<p>8.4 The Impact Hypothesis forms the basis for defining field monitoring. The measurement programme should be designed to ascertain that changes in the receiving environment are within those predicted. The following questions must be answered:</p> <ol style="list-style-type: none"> 1. What testable hypotheses can be derived from the Impact Hypothesis? 2. What measurements (type, location, frequency, performance requirements) are required to test these hypotheses? 3. How should the data be managed and interpreted? 	<p>8.4 影響仮説は現場における監視の実施内容の基礎となる。測定プログラムの策定に当たっては、投資による環境影響が予想の範囲内であることが確認できるように設計すべきである。以下の点について明確にされなければならない。</p> <ol style="list-style-type: none"> 1. どのような検証可能な仮説が影響仮説から導き出されるか。 2. どのような測定（種類、場所、頻度、要求精度）がこの仮説を検証するために必要か。 3. データはどのようにに管理及び解釈されるべきか。
<p>43 The permitting authority is encouraged to take account of relevant research information in the design and modification of monitoring programmes. The measurements can be divided into two types those</p>	<p>8.6 The permitting authority is encouraged to take account of relevant research information in the design and modification of monitoring programmes. The monitoring program should look at integrity of the</p>	<p>8.5 Due to the large area of potential storage sites there will be a need to give serious consideration to the strategic design of monitoring programmes that use modelling and sampling in a way that makes detection of leaks over the large area possible and defensible. Moreover, long-term monitoring of potential migration or leakage of carbon dioxide streams from sub-seabed geological formations will be important due to the long time scales of carbon sequestration, the potential for large disposal sites, and the buoyant nature of carbon dioxide.</p>	<p>8.5 潜在的貯留サイトは広域にわたるため、可能な限りかつ予防的に広域での漏洩を検出できるモデルと資料を利用する監視プログラムの戦略的計画を策定する必要がある。さらに、海底下地質層からの二酸化炭素流の潜在的移動又は漏洩の長期的監視は、炭素隔離の長期持続性、廃棄場所の潜在的な広域性及び、二酸化炭素の浮揚性などの理由から重要である。</p>
			<p>8.6 許可当局は、監視計画の策定及び修正に当たり、関連の</p>

	<p>within the zone of predicted impact and those outside.</p> <p>44 Measurements should be designed to determine whether the zone of impact and the extent of change outside the zone of impact differ from those predicted. The former can be answered by designing a sequence of measurements in space and time that ensures that the projected spatial scale of change is not exceeded. The latter can be answered by the acquisition of measurements that provide information on the extent of change that occurs outside the zone of impact as a result of the dumping operation. Frequently, these measurements will be based on a null hypothesis - that no significant change can be detected.</p> <p>45 The results of monitoring (or other related research) should be reviewed at regular intervals in relation to the objectives and can provide a basis to:</p> <ul style="list-style-type: none"> 1. modify or terminate the field monitoring programme; 2. modify or revoke the permit; 3. redefine or close the dump site; and 4. modify the basis on which applications to dump wastes are assessed. 	<p>storage site and safeguarding human health and the marine environment. The measurements for disposal of carbon dioxide streams in sub-seabed geological formations can be divided into four types:</p> <ul style="list-style-type: none"> 1. performance monitoring (sometimes referred to as testing the Impact Hypothesis) which measures how well injected carbon dioxide stream is retained within the intended sub-seabed geological formation; 2. monitoring the surrounding geological layers to detect and measure migration of the carbon dioxide stream out of the intended sub-seabed geological formation; 3. monitoring the seafloor and overlying water to detect and measure leakage of the carbon dioxide stream into the marine environment. In this context, special attention should be given to abandoned wells that intersect the sub-seabed geological formation and 4. monitoring marine communities (benthic and water column) to detect and measure effects of any leaking carbon dioxide streams on marine organisms. <p>8.7 Measurements should be designed to determine whether impacts differ from those predicted. For performance monitoring, this can be answered by designing a sequence of measurements in space and time that ensures that the projected spatial scale is not exceeded. For monitoring of overlying geological layers, the seafloor and overlying water, and marine communities, this can be answered by the acquisition of measurements that provide information on the extent of change that occurs as a result of the disposal operation. Frequently, these measurements will be based on a null hypothesis - that no significant change can be detected. As confidence grows that carbon dioxide streams are not migrating or leaking from the sub-seabed geological formation, the frequency of monitoring can be decreased.</p> <p>(EDITORIAL NOTE: discussion is ongoing regarding the following text currently deleted from section 8.7 in the current version: Unless migration of carbon dioxide streams into the geological layers above the sub-seabed geological formation is detected, monitoring the seafloor and overlying water may not be necessary. Similarly, unless leakage of carbon dioxide streams into the seafloor or overlying water is detected, monitoring of marine communities may not be necessary.)</p> <p>8.8 The results of monitoring (or other related research) should be reviewed at regular intervals in relation to the objectives and can provide a basis to:</p> <ul style="list-style-type: none"> 1. modify or terminate the field monitoring programme; 2. modify or revoke the permit; 3. redefine or close the site; and 4. modify the basis on which applications to dump wastes are assessed. 	<p>調査情報を考慮に入れることが望まれる。監視計画は、貯留サイトの完全性（密閉性）と、ヒトの健康および海洋環境の保護を考察するべきである。二酸化炭素流の海底下地質層への処分のための測定は4つに分類できる。</p> <ul style="list-style-type: none"> 1. 注入された二酸化炭素流が、想定された海底下地質層内にどれだけ適切に留まっているかを測定する、性能監視（影響仮説の検証と呼ばれる事がある）。 2. 意図された海底下地質層外への二酸化炭素流の移動を検知及び測定するための、周辺地層の監視。 3. 二酸化炭素流の海洋環境への漏洩を検知及び測定するための、海底及びその上層水域の監視。ここでは、海底下地質層を分断する廃坑井に特に留意するべきである。 4. 二酸化炭素流の漏洩が海洋生物に及ぼす影響を検知及び測定するための、（底生性及び水柱の）海洋生物群集の監視。 <p>8.7 測定は、影響が予測されたとおりかどうかについて決定できるように設計されるべきである。性能監視は、予測された変化の空間的規模が予想を超えていないことを把握するための、一連の時空間的調査を立案することによって対応可能である。上部地層、海底とその上層水域、及び海洋生物群集の監視は、処分の結果として起こる変化の抵当に関する情報を提供する調査によって得たもので対応できる。多くの場合、これらの測定は「顕著な変化は見いだせない」という帰無仮説に基づくものである。二酸化炭素流が海底下地質層から移動もしくは漏洩しないとの確信が強くなるにつれ、監視の頻度を減らすことができる。</p> <p>(編集注：本ページの8.7項で削除されている、以下の文章に關して、議論が進行中である：二酸化炭素流が海底下地質層層の上部の地層へ移動していることが検知されない限り、海底及びその上層水域の監視は不要であるかも知れない。同様に、二酸化炭素流の海底又はその上層水域への漏洩が検知されなければ、海洋生物群集の監視は不要であるかも知れない。)</p> <p>8.8 監視の結果（または他の関連調査の結果）は、その目的に照らして定期的に評価されるべきである。それにより、以下の判断に係る基礎を提供することが可能となる。</p> <ul style="list-style-type: none"> 1. 現場での監視計画を変更、又は終了させる。 2. 許可を変更、又は取り消す。 3. 処分場所を再設定、又は閉鎖する。
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<p>18 Permits should be reviewed at regular intervals, taking into account the results of monitoring and the objectives of monitoring programmes. Review of monitoring results will indicate whether field programmes need to be continued, revised, or terminated and will contribute to informed decisions regarding the continuance, modification or revocation of permits. This provides an important feedback mechanism for the protection of human health and the marine environment.</p>	<p>change as practicable, taking into account technological capabilities as well as economic, social and political concerns.</p> <p>49 Permits should be reviewed at regular intervals, taking into account the results of monitoring and the objectives of monitoring programmes. Review of monitoring results will indicate whether field programmes need to be continued, revised, or terminated, and will contribute to informed decisions regarding the continuance, modification or revocation of permits. This provides an important feedback mechanism for the protection of human health and the marine environment.</p>	<p>change as practicable, taking into account technological capabilities as well as economic, social and political concerns.</p> <p>9.4 Permits should be reviewed at regular intervals, taking into account the results of monitoring and the objectives of monitoring programmes. Review of monitoring results will indicate whether field programmes need to be continued, revised, or terminated, and will contribute to informed decisions regarding the continuance, modification or revocation of permits. This provides an important feedback mechanism for the protection of human health and the marine environment.</p>	<p>9.3. 規制当局は、経済的、社会的、政治的事実及び技術力を考慮に入れて、環境変化ができるかぎり許される環境変化の限界を下回る結果となるように常に努めなければならない。</p> <p>9.4 許可は、監視結果及び監視計画の目的を考慮し、定期的に見直されるべきである。監視結果の検討は、現地における計画を継続するべきか、見直すべきか、又は終結するべきかを指示し、また、許可の継続、変更又は廃止についての知識を要する決定に貢献する。これは、人の健康及び海洋環境を保護するための重要なフィードバック制度を提供する。</p>
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