



EIA procedure

Linking impact assessment to an
environmental management system.
Case study: a downstream upgrading
petroleum plant in Venezuela

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Received 1 July 1999; received in revised form 1 July 2000; accepted 1 July 2000

Abstract

A proponent of a downstream upgrading petroleum plant in Venezuela requested to carry out the mandatory complete EIA report with an Environmental Management System in mind. In Venezuela, a complete EIA report is a document that includes: the Environmental Impact Assessment, the Supervision Plan, the Surveillance Plan, and the Guidelines for a Contingency Plan. For this task, a methodology was proposed to review the role of a complete EIA report within the framework of the requirements of a future Environmental Management System. The outcome was a Proposed Working Model that was applied to the case study. The results showed that the linkage sustains the ongoing use of the complete EIA report in the process of environmental evaluation throughout the life cycle of an industrial plant. In addition, outcomes from the linkage substantially improved the Environmental Supervision Plan in particular. © 2001 Elsevier Science Inc. All rights reserved.

Keywords: Environmental impact assessment; Environmental management system; Green wall condition

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1. Introduction

The Division of Technology, Industry, and Economics of the United Nations Environmental Program held a meeting in 1998 to review and assess the situation concerning Environmental Impact Assessment (EIA) for Industry (UNEP TIE, 1999). Several authors prepared thematic notes on key issues among which Turner (UNEP TIE, 1999), regarding “EIA and the Project Cycle,” stated that:

- An EIA is mostly used as a checklist at the planning/development permission stage only; and
- For an EIA to be effective, it must be operative throughout the whole project cycle. In most cases, there is no formal mechanism to ensure that measures agreed at the planning stage are subsequently carried out, with the result that they are often ignored.

In what follows, Turner’s statements are examined within the Venezuelan context by analyzing issues coming from impact assessments and audits carried out for industrial plants associated with the petroleum and gas sector. Before introducing these issues, a brief background on the Venezuelan legal framework for impact assessment is presented.

For projects related to industrial plants, such as downstream upgrading petroleum plant, Decree 1.257 (República de Venezuela, 1996) requires a complete EIA report that includes the following four documents:

1. The Environmental Impact Assessment.
2. The Environmental Supervision Plan.
3. The Surveillance Plan.
4. The Guidelines for a Contingency Plan.

In what follows, the term “complete EIA report” will refer to the set of the four documents required by Decree 1.257.

In addition to the complete EIA report, a Register of Activities Susceptible to Downgrade the Environment (Registro de Actividades Susceptibles de Degradar el Ambiente, RASDA) must be completed in Venezuela before a new facility starts full operation. The RASDA allows the Ministry of Environment and Natural Resources (MARNR) to learn the operational status of a new industrial facility in relation to air emissions, waste water discharges, and industrial waste management (República de Venezuela, 1995a,b, 1998). If there are already environmental problems with the new facility, then a compliance plan with its schedule must be established.

The procedure established with the EIA, Environmental Supervision Plan, Surveillance Plan, and RASDA might be visualized as a series of cycles of impact assessment. With these Venezuelan cycles of impact assessment, one might think that Turner’s (1999) statements are not appropriate. However, even

for industrial facilities with an EIA approval, there could be issues that cause delay in the processes of environmental management and compliance with regulation. In what follows, examples of these issues are presented under illustrative subheadings.

1.1. Documentation

- Lack of documentation about detailed engineering plot plans, conditions approved by MARNR since the facility first started, site environmental setting and land occupation sequence, environmental control points, compliance status, risk events associated with the facility itself and its neighbors.
- Lack of document control: Although there is an information center, a single employee usually manages the environmental information. In addition, the EIA document may be missing.
- Incomplete information: A register of environmental compliance is inadequate, reports on the health status of workers have not been done regularly and the information about the environmental performance status of process and auxiliary units is available only for those with minor impact.

1.2. Environmental monitoring and measurements

- Lack of technical support for environmental control points and measurements.
- Poor performance of new environmental treatment facilities.
- Inconsistency among verbal, documentary, and field evidences. For example, “We have a waste management plan but, these drums are not in the inventory yet,” or “We know all the substances those drums contain, except for these few.”

1.3. Internal and external communication

- Lack of communication between departments of the industrial facility directly or indirectly related to environmental issues.
- Poor communication with neighbors: A contingency plan exists, but citizens and community authorities are neither aware of nor prepared for it.

1.4. Management commitment

- Lack of empowerment of top-ranking managers with environmental awareness: Responses like, “I was told we did that,” or “I was told we already solved that problem,” are frequent.
- Lack of funds for environmental solutions.
- Lack of understanding by top-ranking engineering managers of the need for an environmental assessment to have information about normal and abnormal conditions of operation and about “miscellaneous byproducts”

associated with the operation, some of which are listed by law as toxic or dangerous waste.

1.5. Management attitude

- Panic about questions on environmental compliance. Responses include, “We’re trying to do our best but our department didn’t have enough funds,” “We’re trying to improve that,” “We’re a little behind the planned schedule,” “We aren’t in such bad shape, are we?”
- Fear that the consultant will inform third parties about the existing situation. Managers tend to issue statements like “The information you are getting is confidential. Before the information is available to third parties, we have to verify that it is correct. The community could be alarmed for no reason.”

The situation just presented reveals that the potential benefits of the complete EIA report are not fully understood. It is our experience that, for the project owners, the complete EIA report is the required step to start the site preparation for the construction and has no anticipated future use. This situation is not unique for Venezuela; for example, Brown (1998) states that the perception of an EIA’s report being an end in itself rather than a means to an end is strongly ingrained in the culture of environmental assessment.

The issues presented show that the environmental variable has not been realistically integrated as part of the organization. This situation takes place even in businesses with an environmental assessment culture and a proactive environmental discourse. One might think that this fact is related to the Venezuelan critical economic situation. Nevertheless, Piasecki et al. (1999) cited this text from the Rocky Mountain News (1993):

In the middle of 1990s, the National Law Journal surveyed 223 corporate attorneys of firms having annual revenues in the \$50 million to \$10 billion range. Sixty-seven percent said their companies had violated environmental laws in the previous year. Moreover, 67 percent also said that they believe that full compliance is impossible.

Due to the issues presented above, an organization responsible for an industrial facility may reach what is known as a Green Wall Condition that is characterized by efforts on environmental issues with no substantial results and lack of real progress among the portfolio of environmental programs. This term was first used by Robert Shelton from the A.D. Little firm (Piasecki et al., 1999).

In addition to the issues already mentioned, by reviewing RASDA documents one may find out that the compliance plan schedule for a new facility in operation might have multiple extensions. This suggests that MARNR has adopted a conciliatory and not an enforcing attitude once a facility is in operation. The possibility of a noncompliance situation of a new facility and extensions for

compliance once in operation could lead to a Green Wall Condition. Thus, there is in the facility's environmental program a repeating pattern of the phenomenon mentioned by Piasecki et al. (1999): one step forward, one step backward. Carr and Thomas (1997) stated that the balance between providing incentive for improving compliance and preventing the manipulative use of "audits of convenience" as cover for violations has been and will continue to be difficult to define and implement.

In this context, an interdisciplinary team of professionals in charge of an environmental assessment might start the study either with a feeling of anticipated frustration, supported by fast findings, or with a challenging attitude to show the importance of a complete EIA report for the organization needs. The challenging attitude is what motivates this paper. In our opinion, one way to enhance the importance of a complete EIA report within an organization might be to prove that its findings feed the future Environmental Management System designed under ISO 14001. Other authors support the perspective of this article. For example, Cadwell (1998) stated that the full benefit of an environmental assessment depends upon the internalization of the process and its findings within the existing structure. Unless EIA contributes to the organization's learning and reviewing priorities, its effective implementation is unlikely. Ridgway (1999) stated that the role of an EIA must be reviewed within the framework of other environmental tools, particularly the environmental management system standard ISO 14001.

The purpose of this paper is to present an exploratory case study to review the potential role of a complete EIA report within the framework of the requirements of future Environmental Management Systems, keeping in mind that the objectives of these managing tools are different. In what follows, background on the case study is first presented, then there is a reference of the methodology proposed to establish the linkage between a complete EIA report and an Environmental Management System. Finally, the results and the lessons learned from the experience are singled out.

2. Background on the case study

In 1993, the Venezuelan government approved joint investments with foreign capital shares to develop marginal and new oil fields. In 1997, a Venezuelan petroleum organization and three American companies formed one of the Associations to develop and reactivate a sector of heavy crude oil fields. For the purpose of this paper, this association will be referred as "the Association."

The Association expected to find heavy crude oil (API 16°) in these fields. Therefore, a downstream upgrading plant was required to get commercial crude oil (API 27°). The downstream upgrading plant will be located in an existing industrial complex where four other similar downstream upgrading plants will operate in addition to three other plants for gas and petrochemical processes.

As established in Decree 1.257, MARNR requested a complete EIA report for the Downstream Upgrading Plant. The report was based on the basic engineering design.

In the first meeting between the Association and the Institute of Natural Resources of the Simón Bolívar University, which was selected to do the complete EIA report of the downstream upgrading plant, it was stated that the Venezuelan counterpart of the Association would supervise the complete EIA report. From now on, the term “Association supervisor” will refer to the Venezuelan Association supervisor of this complete EIA report.

In that first meeting, the Association supervisor specified that the required impact assessment had to be conducted with ISO 14000 in mind, but no further guidelines were given on how to accomplish this task. The interest of the Association on ISO 14000 guideline was not a surprise, since in 1997 the Venezuelan Commission of Industrial Standards (Comisión Venezolana de Normas Industriales — COVENIN) approved its version of ISO 14001. Moreover, the Institute was aware that “the developments in ISO 14000 should be a priority for any business, whether or not it intends to certify its Environmental Management System to ISO 14001” (Maiden in BNA, 1998).

The Institute interpreted the request of the Association supervisor as a need to explore the potential use of the complete EIA report information in relation to the requirements of a future Environmental Management System. This was indeed a challenge, particularly for the team of professionals in charge of the complete EIA report coordination. The coordination team had to set the basis for this linkage and justify to MARNR foreseen changes in the complete EIA report.

In what follows, the term “linkage” refers to the revision of the potential role of a complete EIA report in relation to the needs of an Environmental Management System.

3. Methodology for the linkage

Under the ISO 14000 series, ISO 14001 is the only prescriptive specification standard. It is a model of an Environmental Management System (BENCHMARK Environmental Consulting, 1995). The only requirement needed for an organization to be registered under ISO 14000 is the certification of its Environmental Management System. The certification is voluntary because the International Organization for Standardization (ISO) is nongovernmental and it has no authority to impose its standards on any country or organization (Cascio et al., 1997).

An Environmental Management System is not a substitute for existing environmental legal obligations established for operational purposes (COVENIN, 1997). The value of an Environmental Management System is “in fostering a commitment to environmental progress and continual improvement of the organization’s ability to meet its environmental responsibilities and obligations” (Cascio et al., 1997). Therefore, the proposed linkage should be based on the

creation of a proactive managerial attitude to consider the environmental variable in all phases of an industrial facility: design, procurement, construction, operation, maintenance, and dismantlement.

In this context, the methodology for the linkage was based on the following considerations:

Even though a complete EIA report and an Environmental Management System are different documents and are used in different time frameworks, without distorting the purpose of an EIA, it could be interesting to find out if there are:

- Aspects of a complete EIA report that can be used for an Environmental Management System.
- Aspects of a complete EIA that could be modified to facilitate the linkage.
- Aspects of an Environmental Management System that could be considered in a complete EIA report to facilitate the linkage.

Based on the ideas presented above, the methodology for the linkage was conceptualized in the following four phases.

3.1. Phase I: scoping of elements for the linkage

For this phase, 2×3 matrices were prepared for each requirement of an Environmental Management System. Each matrix had a title to show the requirement of the Environmental Management System under consideration and in parenthesis the specific section of the requirement under analysis. The three cells in the first column guided the reader into the aspect being considered:

1. Requirement of the Environmental Management System.
2. Aspects of a complete EIA report that can be used for an Environmental Management System or that could be modified to facilitate the linkage.
3. Aspects of an Environmental Management System that could be considered in a complete EIA report to facilitate the linkage.

The second column showed the information gathered for the three items considered in the first column.

The set of matrixes thus obtained was designated as the “preliminary working model.” This model was validated in Phase II.

3.2. Phase II: validation of the preliminary working model to obtain a proposed working model

This phase had three steps:

Step II.1. Discussion of the preliminary working model with the Institute’s coordination team.

Step II.2. Discussion of the first revised version of the preliminary working model with the Association supervisor.

Step II.3. Preparation of the “Proposed Working Model” based on the revisions carried out in Steps II.1 and II.2.

Based on the results from Steps II.1 and II.2, the preliminary working model was renamed the “Proposed Working Model.” After agreement on the Proposed Working Model, it was clear to the Institute’s coordination team that the linkage would introduce information not required by Decree 1.257 into the complete EIA report. Therefore, MARNR had to approve the additional information, primarily for the Environmental Supervision Plan. Before presenting the Proposed Working Model to MARNR, it was necessary to visualize the possible structure of the manual proposed for the Environmental Supervision Plan because this manual was a new element in a complete EIA report.

3.3. Phase III: setting a structure for the Environmental Supervision Plan manual with an environmental management system in mind

To structure the Environmental Supervision Plan manual, the Association supervisor suggested using ARCO’s Environmental, Health and Safety Performance Standards Manual Operation (1998) as a guideline. In order to include the approach of the Proposed Working Model and the requirements of Decree 1.257, the Institute coordination team modified ARCO’s manual structure for the Environmental Supervision Plan.

3.4. Phase IV: MARNR’s validation of the Proposed Working Model and of the Environmental Supervision Plan manual

The Proposed Working Model and the Environmental Supervision Plan manual structure were presented to MARNR’s central office for their approval. This office is responsible for issuing guidelines on EIA, so their approval was necessary in order to apply the Proposed Working Model.

4. Results from the methodology for the linkage

4.1. The proposed working model

The requirements of an Environmental Management System reviewed for the Proposed Working Model were the ones established by COVENIN 14001:1996 (COVENIN, 1997). These requirements are not specific to the Venezuelan case. They are the requirements set in ISO 14001-1996 (Perry Johnson, 1996; Cascio et al., 1997; Dames & Moore, 1997). Therefore, the results of the methodology for the linkage are not geographically confined and are applicable to industrial facilities in general.

Table 1

Requirement 4.1: management commitment

Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	4.1. Management commitment The organization must have an effective Environmental Management System.
Aspects of a complete EIA report that could be used or modified to facilitate the linkage	It could be mentioned in the introduction of the EIA document that the findings will support a future Environmental Management System under COVENIN 14001/ISO 14001 guidelines.
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	The methodological sections of the complete EIA report could specify the aspects of COVENIN 14001:1996/ISO 14001 that were considered.
	Not applicable

Tables 1–18 are the 18 matrixes that conform the Proposed Working Model. The results show that there is potential for linkage because there are:

- Aspects of a complete EIA report that can be used for an Environmental Management System.
- Aspects of a complete EIA that could be modified to facilitate the linkage.
- Aspects of an Environmental Management System that could be considered in a complete EIA report to facilitate the linkage.

Table 2

Requirement 4.2: an environmental policy

Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	4.2. Environmental policy Statement by the organization of its intentions and principles on environmental performance to provide a framework for action and for the setting of its environmental objectives and targets (translation based on Dames & Moore, 1997)
Aspects of a complete EIA report that could be used or modified to facilitate the linkage	In the objectives of the EIA document it could be mentioned that its findings may be the basis to establish: <ul style="list-style-type: none"> – A compromise for setting the environmental objectives and targets of the Association, including compliance with existing national and international regulations to achieve a higher performance standard; – A revision of the Association’s objectives and environmental goals; and – A compromise of the Association to be a responsible neighbor within the industrial complex and its surrounding community.
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	A task for supervisors should be getting acquainted with the existing environmental policy of the organization in all the phases of the Environmental Supervision Plan.

Table 3

Requirement 4.3: planning (Section 4.3.1 — environmental aspects and impacts)

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.3.1. Environmental aspects and impacts. Definition of: – Environmental aspect: activities, products, or services of the organization that can interact with the environment. – Environmental impact: any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization’s activities, products or services. An organization needs to establish a procedure to identify the environmental aspects of its activities, products, or services that it can control and over which it expects to have an influence. An organization that does not have an Environmental Management System needs first a Register of Environmental Aspects. The Register is necessary to identify all environmental aspects and the associated existing and potential impacts that may be related to the organization’s activities or operations and that should be eliminated, managed, or controlled (Dames & Moore, 1997).</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The complete EIA report is the building block for an Environmental Management System because: The methodological section of the EIA document is the basis to set a procedure to identify and hierarchically organize the environmental aspects related to an industrial facility. The complete EIA report is the basis for a Register of Environmental Aspects because of its information on the: – Designed normal operative conditions. – Expected abnormal operative conditions (start up/shut down/periodic maintenance). – Expected incident/accident conditions. – Expected discharges or releases to air, land, or water under normal or abnormal conditions. – Expected generation and disposal of waste. – Conditions of the area of influence before the project took place. – Expected impacts of the plant itself and its cumulative impacts due to its location on an industrial complex. – Significant level of potential impacts. – Environmental measures proposed to prevent, eliminate, or reduce impacts. – Environmental measures proposed or incorporated during the phases of site preparation, construction, and start up. – Recommended Surveillance Plan for identified impacts.</p>

(continued on next page)

Table 3 (continued)

<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage.</p>	<p>In addition, the Environmental Supervision Plan and the Surveillance Plan reports could be the basis for comparing the real environmental performance of an industrial facility with the one expected in the design, thus allowing the Association to acquire a more realistic Register of Environmental Aspects.</p> <p>Since the environmental standards considered in facility design are pointed out in the EIA's document, this information is the basis for updating the existing regulatory reference once the Register of Environmental Aspects is done. Hence, critical environmental controls that were not considered in the original design may be now identified.</p> <p>Register of Environmental Aspects should be sectionalized and the relevant section kept at the workplace to which it applies (Dames & Moore, 1997).</p> <p>In this sense, the EIA should provide process diagrams for each structural (process or auxiliary) component of the industrial facility. Each diagram should show:</p> <ul style="list-style-type: none"> – Points where discharges or releases to the environment take place. – The expected quantities of discharges or releases in comparison with the existing regulation. – The recycle of flows in each process unit. – A brief description of the process that take place in the particular unit. – Risks associated with the unit. – The points established in the design for surveillance whenever available. <p>In addition, the process diagrams should be complemented with tables for each structural component of the industrial facility to show prevention and mitigation measures considered in the basic design for potential impacts. The Environmental Management System exerts influence on external contractors and suppliers that are related to environmental impacts (COVENIN, 1997, 4.4.2d).</p> <p>Therefore, the Environmental Supervision Plan could consider activities such as:</p> <ul style="list-style-type: none"> – The supervision of the detailed engineering to corroborate that the actions reviewed in the EIA are included, or that new impacts are assessed. – The supervision of the procurement of equipment to confirm that the proposed environmental specifications in the design are met in the acquisition process. – The supervision of contractors to guarantee the achievement of proposed environmental actions and the screening of new ones. <p>If relevant, the Environmental Supervision Plan should include corporate guidelines and codes of practice.</p>
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Table 4

Requirement 4.3: planning

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.3.2. Updated register of regulatory and other requirements The organization needs to establish a procedure to identify and have access to legal and other requirements (standards, codes of practice) to which the organization subscribes, directly applicable to the environmental aspects of its activities, products, or services translation based on Dames & Moore (1997).</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The EIA could single out the standards used in the basic engineering design of the industrial facility's process units and auxiliary systems. Tables could show the industrial facility's predicted values of emission, discharges, and waste generation and compare them with the Venezuelan standards and others used if different from the national limit. This information provides input for the Environmental Management System requirement in relation to an organization's register of legislation and regulations.</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered the linkage</p>	<p>Process diagrams for each structural component of the industrial installation could show, at source points; – The expected emission or discharge values. – The standard for compliance. The Environmental Supervision Plan could verify during the project phases (from detailed engineering to start up operation) that the industrial facility meets the most recent regulation. The goal of the organization should be to start operation in full compliance with the existing regulation.</p>

4.2. The structure for the Environmental Supervision Plan manual

The Environmental Supervision Plan is a follow-up intended to (República de Venezuela, 1996):

- Verify compliance with the proposed measures in the EIA to prevent, minimize, or correct impacts.
- Verify compliance with land occupation conditions established by MARNR.
- Verify whether impacts and measures identified in the EIA take place.
- Register unforeseen impacts and associated measures.

Decree 1.257 specifies that the Environmental Supervision Plan must be supervised. Professionals in charge of this task may or may not be the same ones

Table 5
Requirement 4.3: planning

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.3.3. Objectives and targets Definition of: – Environmental objective: overall environmental goal arising from the intended environmental policy of the organization, quantified when possible. – Environmental target: detailed performance requirement, quantified when possible, that arises from the environmental objectives and needs. The organization needs to document environmental objectives and targets at each relevant function and level (translation based on Dames & Moore, 1997). For an Environmental Management System certification, the organization must prove that it considered prevention of pollution in its activities, services, and products (Cascio et al., 1997).</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The complete EIA report may set the basis for the environmental objectives and targets of an organization. In the section of the EIA document that explains technological considerations of the project, it could be mentioned that a goal of the Association is to deal with environmental issues so no further fitting is needed once the industrial plant is in full operation. This result would depend upon a full consideration of the measures coming from the EIA document.</p>
<p>Aspects of COVENIN 1400/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>The Environmental Supervision Plan could be more like a manual than a checklist for the advancement of environmental measures suggested in the EIA document. Once the Environmental Supervision Plan begins, the supervisor in charge gets a list of environmental measures to supervise. However, there are no written instructions about how the organization, or MARNR, wants the goal to be achieved. In addition, there is no specification about documents to be requested from third parties, contractors, or vendors to prove to MARNR or the Association that the approved measures were considered. Therefore, the Environmental Supervision Plan goals should be on paper as instructions, as well as the type of managerial support that the supervisor would get from the organization to achieve a well-linked job.</p>

assigned to supervise the EIA. The Environmental Supervision Plan supervisor(s) must notify MARNR of the follow-up progress with several reports that are scheduled in the Environmental Supervision Plan. The Environmental Super-

Table 6

Requirement 4.3: planning

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.3.4. Environmental management program An organization must establish a procedure that covers the development of environmental management program(s) within various levels, divisions, or sections (translation based on Dames & Moore, 1997). The program must include a Register of Environmental Aspects for new activities.</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>As stated in Table 3 and in this section, the first step for an Environmental Management Program is a Register of Environmental Aspects. The methodological section of the EIA document could be written with this in mind, particularly for the description of the procedure to identify and hierarchically organize impacts.</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>The Environmental Management Program should state that employees at all levels would have a responsibility to assist in achieving the program items over which they have some impact (translation based on Dames & Moore, 1997). This approach could be included in the Environmental Supervision Plan as well. Thus, it is important to identify relevant managerial levels responsible for accomplishing the Environmental Supervision Plan and to specify their activities to support supervisors.</p>

vision Plan may continue in case there are actions proposed in the EIA that take place once the facility is in full operation (such as waste management).

Prior to the case study, MARNR suggested organizing the Environmental Supervision Plan in performance layouts. It also was recommended to use a table format for these layouts, arranging the information in columns as follows:

1. Activity or risk events that cause environmental impacts.
2. Environmental impacts associated with the activity or event.
3. Relative level of the expected impact (high, medium, or low) in order to guide the efforts of the Environmental Supervision Plan's supervisor.
4. Identified measures to prevent, correct, and minimize each environmental impact.
5. Tentative starting time to accomplish each particular measure.
6. Tentative finishing time for each particular measure.
7. Proposed supervision frequency for each measure (hourly, daily, monthly, etc.).
8. Status of advancement of a measure at the time of the supervision (such as Not initiated, In progress, Pending, Deferred, Concluded, Modified, Canceled).

Table 7

Requirement 4.4: implementation and operation

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.4.1. Structure and responsibility An Environmental Management Program requires that: – All employees have their environmental responsibilities described in their position or duty statements. – The organization provides human, physical, and financial resources to implement and verify the environmental management plan. – Top managers assign environmental coordinators responsible for: 1. Ensuring that Environmental Management System requirements are established, implemented, and maintained in accordance to COVENIN 14001/ISO 14001. 2. Reporting on the performance of the Environmental Management System to top management for its review and improvement (translation based on Dames & Moore, 1997).</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The Environmental Supervision Plan and an Environmental Management System have similar aspects. For example, the environmental measures must have the corresponding organization, human, and financial resources for its accomplishment; and the verification of each measure must have an established frequency and a field indicator. Decree 1.257 states that the Environmental Supervision Plan requires supervision. This activity could be carried out by the organization itself or by a consultant firm that fulfills the requirements established by the Decree. Therefore, completing an Environmental Supervision Plan prior to the full operation of an industrial plant is an excellent way to prepare the organization for the Environmental Management System requirement: “structure and responsibility.”</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>The Environmental Supervision Plan could be a manual in which specific instructions are fully described and responsibilities are clearly assigned.</p>

- 9. Field indicators of compliance for each measure.
- 10. Department of the organization responsible for accomplishing each measure.
- 11. Budget assigned for each measure (if applicable).
- 12. Timetable to handle Environmental Supervision Plan reports to MARNR.

With the linkage in mind, the Institute coordination team realized that in previous environmental assessments the complete EIA report was written to

Table 8

Requirement 4.4: implementation and operation

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.4.2. Training, awareness and competence The organization needs to identify and provide training for all employees with specific environmental responsibilities.</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The complete EIA report is a basic document for employees, including contractors or vendors, to be acquainted with:</p> <ul style="list-style-type: none"> – The environmental basis of the industrial plant design. – The impacts and their proper management. – The environmental consequences of abnormal conditions of the industrial plant and of others plants, in the case of an industrial complex.
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>The Environmental Supervision Plan could specify for each phase of the development of an industrial plant:</p> <ul style="list-style-type: none"> – The formal qualifications or specific skills required by supervisors. – The need for top managers to go through the specific section of the Environmental Supervision Plan with the person or persons selected for the supervision. – The need for top managers to introduce the supervisor(s) to the rest of the organization, including contractors or vendors, so their role is clearly understood. – The need for the top manager to establish a short internship for the supervisor (s) in the MARNR's regional office to: <ol style="list-style-type: none"> 1. Introduce the supervisor(s) to MARNR's counterpart. 2. Clarify MARNR's expectations for the Environmental Supervision Plan reports as well as the procedure to evaluate them. – The need to make contractors or vendors aware of their responsibility to perform the measures established in the EIA. Therefore, bidding conditions could include the Environmental Supervision Plan specifications for contractors or vendors. This would allow them to consider the cost of these measures in their proposal. Also, bidding conditions could mention that: <ol style="list-style-type: none"> 1. Contractors or vendors must sign a declaration of agreement to perform the Environmental Supervision Plan actions before beginning the job. 2. Contractors and vendors must sign a certification of compliance of the Environmental Supervision Plan actions after finishing the job. 3. Contractors and vendors must give written indication of the reasons why an EIA measure needs to be changed or why a new action is needed.

(continued on next page)

Table 8 (continued)

	<p>4. Contractors and vendors must have approval from the Environmental Supervision Plan supervisor prior to making changes.</p> <p>All phases of the Environmental Supervision Plan could require top managers to inform employees of safety regulations and emergency/disaster response. This is especially important when an industrial plant is going to be built in an already-operating industrial complex.</p> <p>The Environmental Supervision Plan should address instructions for environment, occupational health and safety, when possible. COVENIN 14001/ISO 14001 does not currently include requirements of occupational health and safety. Nevertheless, MARNR requires integration of environment, occupational health and safety issues whenever possible.</p>
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fulfill MARNR’s expectations only, specifically the Environmental Supervision Plan document.

The Proposed Working Model showed the need to have an Environmental Supervision Plan manual. This manual would identify the network of employees sharing the responsibility for performing each phase of the Environmental

Table 9
Requirement 4.4: implementation and operation

Requirement on COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	<p>4.4.3. Communication</p> <p>The organization needs to have and maintain procedures for both internal and external communication to ensure that environmental issues are being effectively managed.</p>
Aspects of a complete EIA report that could be used or modified to facilitate the linkage	<p>The first contact that the public has with the environmental aspects of a project is through the complete EIA report. The report is a public document that can be consulted at anytime. Afterward, the Environmental Supervision Plan reports are the most important external environmental communications that the organization has before the industrial plant is in full operation. The schedule for report submission to MARNR is included in the Environmental Supervision Plan.</p>
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	<p>The Environmental Supervision Plan manual should include a provision for meetings between senior managers and supervisors. A verification checklist for the activities required and performed by the Environmental Supervision Plan supervisor could be included as a way to communicate its progress to senior managers.</p>

Table 10

Requirement 4.4: implementation and operation

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.4.4. Environmental management system documentation The organization needs to establish, in electronic or paper form, a documentation system to describe the elements of the Environmental Management System and their interaction. Also, the organization must provide direction for documentation.</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The complete EIA report has essential information for the Environmental Management Program; therefore, it should be kept for consultation. In addition, the Environmental Supervision Plan and Surveillance Plan reports should also be kept to support environmental compliance. “While environmental performance of an organization is not directly within the purview of ISO 14001 registrars, they can request evidence of environmental performance along with the relevant management reviews and follow-up actions” (Cascio et al., 1997).</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>Not applicable.</p>

Table 11

Requirement 4.4: implementation and operation

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.4.5. Document control The organization needs to establish procedures for controlling documents required by ISO 14001.</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>Once the industrial plant is in full operation, the complete EIA report, the Environmental Supervision Plan reports, and material gathered to sustain the achievement of environmental measures should be identified in the Environmental Management System as “information to be retained for legal and/or knowledge preservation purposes” (COVENIN, 1997).</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>The Environmental Supervision Plan manual should identify material that must be retained for legal and/or knowledge preservation purposes. The legal department of the organization should be the custodian of the certifications of accomplished environmental measures. This is especially important because a third party or MARNR can initiate an administrative procedure based on the suspicion of lack of compliance and MARNR visits for verification purposes can take place unannounced (República de Venezuela, 1996).</p>

Table 12
Requirement 4.4: Implementation and operation

Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	4.4.6. Operational control The organization needs to identify activities and operations associated with significant environmental aspects that are identified in the Register of Environmental Aspects. Also, it must establish specific work procedures for all these activities including maintenance.
Aspects of a complete EIA report that could be used or modified to facilitate the linkage	The EIA document has relevant information to identify activities and operations requiring work procedures.
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	The EIA could provide comprehensive process diagrams for each structural component of the industrial plant (Table 3).

Supervision Plan, up to the full operation and maintenance of the facility (Table 19, column 1). The Environmental Supervision Plan supervisor is just one of the actors involved in this network; he or she cannot work isolated without the support of the organization.

It became obvious that the Environmental Supervision Plan manual needed written instructions for employees about the tasks to be accomplished in each

Table 13
Requirement 4.4: implementation and operation

Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	4.4.7. Emergency preparedness and response The organization must establish and maintain a procedure to identify the potential environmental incidents that need to be covered by an emergency response plan.
Aspects of a complete EIA report that could be used or modified to facilitate the linkage	As required by Decree 1.257, the complete EIA report should have a section on guidelines for developing and implementing an emergency response plan. This is useful information for the Register of Environmental Aspects.
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	If the proposed industrial plant will be part of an industrial complex, the guidelines for the contingency plan included in the complete EIA report should identify possible emergency situations that could take place in other facilities that, in turn, could affect the industrial plant under study. In addition, the Environmental Supervision Plan could include a task to verify the existence of an emergency response plan for the industrial complex as a whole prior to the full operation of the new plant. This should trigger the organization's proactive role in emergency preparedness and response.

Table 14

Requirement 4.5: monitoring and measurement

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.5.1. Monitoring and measurement The organization must establish procedures for the regular monitoring and measurement of its actual performance against the key characteristics of its activities and operations that can have a significant impact on the environment (translation based on Dames & Moore, 1997).</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>As required by Decree 1.257, the complete EIA report must include a Surveillance Plan. This plan must set the basis to identify changes in the environment associated with the construction and operation phases of the plant and to verify compliance with existing regulations. The Surveillance Plan is the basis for the Environmental Management System requirement: “monitoring and measurement.”</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>For this particular requirement of the Environmental Management System, the Surveillance Plan could consider guidelines set in ISO 14031 (Environmental Performance Evaluation — EPE). These guidelines state that the overall planning effort should focus on the selection of indicators to facilitate the collection of meaningful data and allow accurate expression of environmental information. Indicators should be established to cover all systems: managerial, operational, and environmental. Many of the indicators may cut across all three of these systems or run in parallel (Kuhre, 1997). Therefore, an effort could be made in the Surveillance Plan to select not only environmental indicators but also operational and managerial indicators that are connected to the environmental indicators. The EIA and the Environmental Supervision Plan could include a task to verify if the industrial plant designs for operational and auxiliary units with significant environmental impacts have control points and the equipment to take measurements. For the Environmental Supervision Plan, Decree 1.257 states the need to document results from monitoring and measuring activities and to identify and implement required corrective actions. Thus, it should be highlighted in the Environmental Supervision Plan that this information should be submitted to MARNR as part of the Environmental Supervision Plan reports. In addition, the Environmental Supervision Plan should include the need to report Environmental Supervision Plan results to top managers.</p>

Table 15

Requirement 4.5: monitoring and measurement

<p>Requirement of COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>4.5.2. Nonconformance, corrective, and preventative action.</p> <p>There must be a procedure within the Environmental Management System to ensure that all nonconformance is identified and corrected in a timely manner. The organization must establish procedures for the management of system nonconformance, including the assignment of responsibilities and the reporting of action taken for:</p> <ul style="list-style-type: none"> – Identifying and reporting nonconformance with any of the requirements of the Environmental Management System. – Taking immediate action to control and minimize any environmental impacts resulting from the nonconformance. – Identifying corrective and preventive action. – Initiating and completing corrective and preventative action.
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The organization must demonstrate that these procedures are in place and being applied (translation based on Dames & Moore, 1997).</p> <p>Nonconformance in ISO 14001 refers to deviations from the Environmental Management System, not to deviations from legal compliance. However, one aspect of nonconformance of an Environmental Management System might be caused by noncompliance with a regulation (Cascio et al., 1997). In this sense, the Environmental Supervision Plan and Surveillance Plan are the basis to measure performance against regulatory requirements and other specified indicators such as internal or external codes of practice. All this information would support the future Register of Environmental Aspects.</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>An important aspect of an Environmental Management System is ensuring that instances of nonconformance with the system requirements are identified and corrected (COVENIN, 1997). This goal is similar for both an Environmental Supervision Plan and a Surveillance Plan. Nevertheless, the focus of an Environmental Supervision Plan is the compliance with actions set in the EIA. The focus of a Surveillance Plan is compliance with the existing regulation.</p> <p>To improve the goals of an Environmental Supervision Plan and a Surveillance Plan, the following aspects might be considered:</p> <ul style="list-style-type: none"> – A procedure to ensure that all noncompliance issues are identified and corrected in a timely manner.

Table 15 (continued)

	<ul style="list-style-type: none"> – A procedure to trace causes of noncompliance to prevent future incidents of failure. In this sense, it is important to guide the supervisor of the Environmental Supervision Plan in relation to the documents that must be obtained from contractors or vendors for the certification of accomplishment of environmental measures. <p>The supervisor must be aware that nonconformance with the Environmental Supervision Plan requires notification to MARNR. This government agency can initiate an administrative procedure if notification does not take place.</p>
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given phase, at all levels of management involved. Tasks needed to be organized for each phase by:

- Rank of the person in charge of the task within the organization management structure set for the Environmental Supervision Plan. The

Table 16
Requirement 4.5: monitoring and measurement

<p>COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)</p>	<p>Section 4.5.3 Environmental Management System records.</p> <p>The organization must establish and maintain procedures to:</p> <ul style="list-style-type: none"> – Identify Environmental Management System records that must be retained. – Assign responsibility for the maintenance of Environmental Management System records, – Specify the location of the Environmental Management System records. – Specify a retrieval and replacement process. – Specify the length of time that each record must be kept. <p>Internal or external complaints must be kept (translation based on Dames & Moore, 1997).</p>
<p>Aspects of a complete EIA report that could be used or modified to facilitate the linkage</p>	<p>The complete EIA report is a document that must be retained for future reference once the plant is in operation.</p>
<p>Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage</p>	<p>The EIA document could include the perception of land users about the environmental conditions of the area of influence of the industrial plant prior to its development. The Environmental Supervision Plan and the Surveillance Plan could indicate documents that must be kept by the organization and the departments responsible for this assignment.</p>

Table 17

Requirement 4.5: monitoring and measurement

COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	<p>Section 4.5.4. Environmental Management System audit</p> <p>The organization must establish a systematic and documented verification process to objectively obtain and evaluate evidence to determine whether:</p> <ul style="list-style-type: none"> – Its Environmental Management System conforms to the environmental management system audit criteria set by the organization itself. – The system has been properly implemented and maintained. – The information about the performance of the Environmental Management System has reached the required managerial levels (translation based on Dames & Moore, 1997).
Elements of the complete EIA report that could guide a user in the linkage or that could be modified for that purpose	<p>The purpose of the Environmental Management System audit, once the system is in operation, is to verify conformance with agreements set by the organization. The purpose of this audit is not to verify environmental performance (Cascio et al., 1997; BENCHMARK Environmental Consulting, 1995).</p> <p>Among the items verified in an Environmental Management System’s audit are:</p> <ol style="list-style-type: none"> 1. The environmental criteria set for operation. 2. The procedures to identify environmental impacts. 3. The procedures for performing environmental monitoring. 4. The procedures to identify measurements to correct or prevent environmental impact (Perry Johnson, 1996).
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	<p>We suggest that the fundamental building blocks to establish these procedures are the project description and the methodological sections of the complete EIA report.</p> <p>Not applicable.</p>

task sequence would start with activities to be accomplished by senior managers and end with those carried out by contractors/vendors (Table 19, column 2).

- Sequence in which activities would take place in each phase, whenever there is more than one activity to accomplish. Examples include training of the supervisors of environment; bidding and contract revisions; training of contractors or vendors; and discussion with contractors or vendors of the Environmental Supervision Plan (Table 19, column 3).

Table 18
Requirement 4.5: management reviews

COVENIN 14001:1996 (COVENIN, 1997)/ISO 14001 (Cascio et al., 1997)	4.6. Management reviews
Elements of the complete EIA report that could guide a user in the linkage or that could be modified for that purpose	<p>The organization must establish a procedure which requires that senior management undertake periodic reviews of the EMS to ensure that it continues to:</p> <ul style="list-style-type: none"> – Meet the identified needs of the organization. – Remains effective. <p>Cascio et al. (1997) states that information needed for the management review includes performance results and environmental incidents. This information could be presented graphically to show, for example, sequences of:</p> <ul style="list-style-type: none"> – Waste discharges. – Air emissions in normal and abnormal conditions. – Water generated in normal and abnormal conditions. – Equipment failures. – Human failures.
Aspects of COVENIN 14001/ISO 14001 that could be considered in a complete EIA report to facilitate the linkage	<p>The EIA is a source for starting cumulative impact charts. The Surveillance Plan is the source for the information required for foreseeing changes over time.</p> <p>Not applicable.</p>

Tasks needed to be codified with a Performance Code (PC). Each PC would have a number in a sequence related to the complete Environmental Supervision Plan (Table 19, column 4). Each task could have a specific instruction sheet (Fig. 1). The written instructions for an Environmental Supervision Plan should not be delivered in “environmentalese” (term used in Piasecki et al., 1999). When the instructions are being written, the consultant must assume the role of the employee who will perform the given task. Instructions should be as direct as possible. These instructions could explicitly identify the records to be kept in order to support compliance.

Finally, the Surveillance Plan could be included in the Environmental Supervision Plan manual as part of the instructions for the environmental supervisor in the Operation and Maintenance phase rather than considering it a separate document as requested by the Decree 1.257. The Surveillance Plan establishes the basis for:

- Monitoring environmental changes associated with the activities of site preparation and construction, operation, and maintenance.
- Verifying compliance with the existing regulations.

4.3. MARNR response to the Proposed Working Model

A workshop was set with MARNR to present and discuss the Proposed Working Model and the structure of the Environmental Supervision Plan manual. In that workshop, MARNR approved both propositions. Nevertheless, in relation to the Environmental Supervision Plan under the approach of Proposed Working Model, MARNR singled out the following issues as a reminder:

The Environmental Supervision Plan, as stated in Decree 1.257, is a tool to verify compliance with the measures set in the EIA to prevent, correct, or mitigate identified environmental impacts. The Environmental Supervision Plan is not a tool to verify the organization's commitment to consider environmental impacts. Thus, MARNR would focus the revision of the Environmental Supervision Plan document on the performance layouts.

5. Lessons learned from the Proposed Working Model

The complete EIA report has the potential to be a building block for an Environmental Management System, specifically because its findings feed the future Register of Environmental Aspects under ISO 14001.

Integrating the results of a complete EIA report into an organization's future needs might change the project owner's perception about this document: Instead of considering the report an end in itself, now it would be a means to an end. Thus, the complete EIA report may be refocused and expanded beyond that of a purely decision-making document (Ridway, 1999).

The try out of an Environmental Supervision Plan, following the Proposed Working Model guidelines, is an excellent exercise prior to establishing an Environmental Management System. An Environmental Supervision Plan sets in motion a communication network and trains employees at all levels of management to share environmental responsibilities. Thus, the Environmental Supervision Plan becomes an early building block for a proactive environmental culture of an organization.

The potential for the linkage makes it possible to visualize the integration of the environmental variable through the life cycle of an industrial plant as an iterative process of continual revision cycles in time. As shown in Fig. 2, in Venezuela a sequence of these cycles can be clearly identified. When a plant needs an upgrade in its process or its operational capacity, it can jump to another process of continual revision cycles.

The whole purpose of the process of continual revision cycles is to achieve, in time, a decreasing gradient of environmental change. The anticipated goal in full operation is to have emission and discharge values lower than those specified in the existing regulations. Once the facility is dismantled, the anticipated goal is to restore the site as close as possible to its original condition.

Table 19
Structure for the environmental supervision plan manual (IRNR, 1998)

Phase	Addressee of instruction in the organization	Task for which instruction is addressed	Performance codes (PC) for the instructions
I. Detailed engineering	Senior Manager responsible for the Detailed Engineering and Senior Manager responsible for Environment, Occupational Health and Safety Department	Revision of relevant aspects on Environment, Occupational Health and Safety	PC1
II. Procurement	Senior manager of the Environment, Occupational Health and Safety Department	Revision of the equipment's conformance with specifications of Environment, Occupational Health and Safety	PC2
III. Site preparation	Senior manager of the Environment, Occupational Health and Safety Department	Training of the Supervisor of the Environmental Supervision Plan	PC3
	Supervisor of the Environmental Supervision Plan	Revision of bidding and contracts	PC4
	Supervisor of the Environmental Supervision Plan	Training of contractors	PC5
	Supervisor of the Environmental Supervision Plan	Revision of the Contractors' Plans for site preparation	PC6
	Supervisor of the Environmental Supervision Plan	Supervision of compliance with the Environmental Supervision Plan's performance layouts	PC7

IV. Placement	Senior manager of the Environment, Occupational Health and Safety Department Supervisor of the Environmental Supervision Plan Supervisor of the Environmental Supervision Plan Supervisor of the Environmental Supervision Plan	Training of the Supervisor of the Environmental Supervision Plan Revision of bidding and contracts Contractors' training Revision of Contractors' Plans for the placement of process and auxiliary units	PC8
V. Start up operation	Supervisor of the Environmental Supervision Plan	Supervision of compliance with the Environmental Supervision Plan performance layouts	PC12
VI. Operation and maintenance	Supervisor of the Environmental Supervision Plan Supervisor of the Environmental Supervision Plan Senior manager of the Environment, Occupational Health and Safety Department	Preparation for the start-up operation plan Revision of the start-up operation's results Training of plant's operators	PC13
	Senior manager of the Environment, Occupational Health and Safety Department		PC14
	Senior manager of the Environment, Occupational Health and Safety Department		PC15
	Supervisor(s) of the Environmental Supervision Plan	Training of the Supervisor(s) of the Environmental Supervision Plan and Surveillance Plan Revision of bidding and contracts	PC16
	Supervisor (s) of the Environmental Supervision Plan	Contractors' training	PC17
			PC18

<p>Phase for which the instruction is given Example: Detailed engineering</p>
<p>Addressee of the instruction in the organization Example: Senior Manager of the Environment, Occupational Health and Safety Department</p> <p>Particular task for which the instruction is given – PC# (Performance Code Number) Example: Revision of the relevant aspects of Environment, Occupational Health and Safety - PC1</p>
<p>Purpose of the instruction Example: To guarantee that the engineer in charge of the industrial plant detailed design has formally verified the inclusion of the measures coming from the environmental impact assessment document</p>
<p>Instruction Example: The engineer in charge of the industrial plant environmental design must establish: A procedure to verify that changes in this phase have been environmentally evaluated. These changes could be related to: process conditions, environmental controls or risk events</p>
<p>A reminder if necessary Example: Changes related to Environment, Occupational Health and Safety that could take place during this phase must be communicated to MARNR</p>

Checklist of Activities accomplished

Example:

Identification of the activities:

Activities for the engineer responsible of the detailed design
 Estimated time to carry out the activities: 116 weeks

**Activities accomplished by the engineer
 responsible for the industrial plant detailed design**

	Yes	No
<i>Example: Communicate changes to MARNR supported by an environmental statement</i>		

Observations:

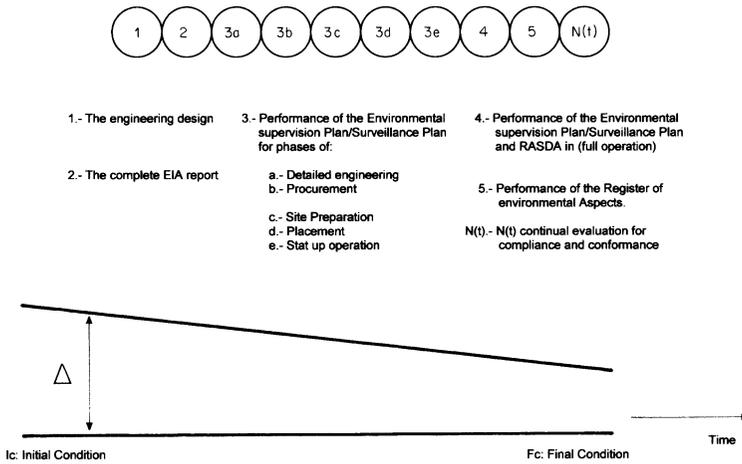
SOURCE: IRNR (1998) modified from ARCO (1998)

Fig. 1. Proposed instruction sheet for the Environmental Supervision Plan manual.

The continual revision cycles tend to move quickly in Cycles 1 and 2, because in these stages the organization is expecting the approval of site preparation. Thereafter, achievements gained through the revision process might slow down, resulting in a much lower variation in the gradient of environmental change, which means that the organization has reached the Green Wall Condition (Piasecki et al., 1999) (Fig. 2).

A way for an organization to avoid a future Green Wall Condition is to support the evaluation cycles with effective environmental compliance and conformance.

Continual Cycles of Revision and Expected Gradient of Environmental Change



Gradient of Environmental Change and The Green Wall Condition

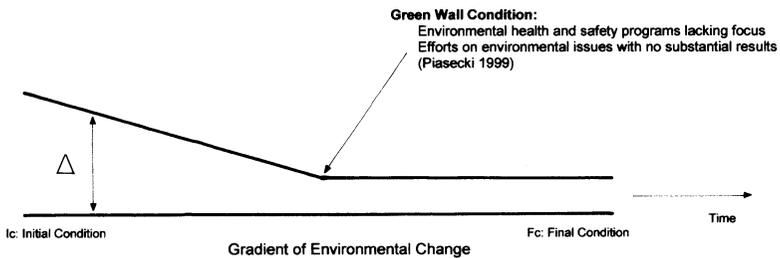


Fig. 2. Continual cycles of revisions and the Green Wall Condition.

As pointed out in this paper, environmental regulations may not be enough to push an organization beyond a “green wall” stage. An organization needs to have the commitment and determination to move, over time, toward the expected decreasing gradient of environmental change. Thus:

The organization that commits to an effective Environmental Management System, to regulatory compliance and to prevention of pollution is on the road to environmental progress. Conversely, an *organization* that makes implementation of an *EIA* or an Environmental Management System only a paperwork exercise will get none of the benefits and may produce employee cynicism and less environmental care (Cascio et al., 1997, *italics* introduced for this paper).

Records must support effective environmental compliance and conformance. These records come out of the different revision cycles. Their comparisons over time are the most reliable way to learn the position of an organization along the expected gradient of environmental change.

With the Proposed Working Model in mind, it became obvious that contractors and vendors were key factors in accomplishing environmental tasks and avoiding a Green Wall Condition. They must be informed about the proposed environmental actions to be carried out and their responsibilities. This communication must start in the bidding process. Contractors and vendors must know, before they start the job, the environmental rules of the game and what records are expected from them to support compliance. Also, communication should flow in both directions. Contractors and vendors have hands-on experience and, consequently, their suggested changes in the proposed actions could result in better solutions.

Based on the Proposed Working Model, innovations to prove contractors' and vendors' compliance (and, in turn, to support the organization's indemnity claims if actions are not accomplished) were:

- The contractor or vendor "Declaration of Agreement" to perform the required measures before the job starts.
- The contractor or vendor "Certification of Compliance" of the environmental measures after finishing the job.

Keeping the process of continual cycles of evaluation in mind, the consultant in charge of a complete EIA report must communicate this vision to the organization. The linkage does not guarantee the expected success, but just can make it easier. Piasecki et al.'s (1999) statement sums up the importance of communication for effective results: "Becoming familiar with the intent of the vision is the first step toward understanding and supporting implementation of the vision."

Acknowledgments

The authors are grateful to: Victor Vásquez, John Dennehy (from the Clark University-Writing center), and Mary McPherson for the revision of the manuscript; Jeanne Kasperson and B.J. Perkins (from the Marsh Institute of Clark University) for "feeding us" with key information for this paper; Susana Martínez for the drawings; Universidad Simón Bolívar for the financial support for the training on ISO 14001; Ministerio del Ambiente y de los Recursos Naturales Renovables for allowing the Institute to explore the ideas presented in this paper; Eunice Gómez for her financial support to present this paper at the IAIA '98 Annual Meeting in Glasgow, Scotland, which allowed us to enrich the manuscript with

information gathered during this meeting; and to the peer reviewer for the appropriate comments.

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