A Review of Guyana EPA's Guidelines and Checklist for the preparation of Environmental Impacts Assessments

Georgetown, Guyana

Report

NRCan (CANMET) – GENCAPD Mining Project

Our File: M-6763-7 (603430)
February 2004

SNC•LAVALIN
Environment

Member of the SNC•LAVALIN Group

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March 2, 2004

Mr. Richard Couture
Project Technical Director - GENCAPD
Natural Resources Canada - CANMET
555, Booth Street
Room 339B
Ottawa (Ontario)
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SUBJECT: Report on the review of EPA's Guidelines and Checklist for the Preparation of Environmental Impacts Assessments.
PWGSC contract No. 23440-021003
Our file: M-6763-7 (603430)

Dear Mr. Couture:

In compliance with deliverables for item 2.3 of our contract, please find enclosed a Review of EPA's Guidelines and Checklist for the Preparation of Environmental Impacts Assessments. This document also contains a chapter on the awareness of mining inspectors. Unfortunately, owing to a very tight work schedule during our last trip in Guyana, we could not hold a workshop on validating and approving these guidelines. We hope nevertheless that our recommendations and observations are helpful in having the guidelines approved by the stakeholders.

Should you have further questions or comments please do not hesitate to contact the undersigned.

Yours sincerely,

SNC-LAVALIN ENVIRONMENT INC.

Marc Arpin, M.Sc., P.Geo.
Project Director

MA/lj

Encl.

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DISCLAIMER

The primary purpose of this publication is to provide a review of Guyana EPA's Guidelines and Checklist for the Preparation of Environmental Impacts Assessments. It expresses the professional opinion of SNC-LAVALIN ENVIRONMENT INC. (SLI) regarding the matters set out herein, based on SLI's professional judgment and reasonable due diligence. It is to be read in the context of the agreement of August 4, 2003 (the Agreement) between SLI and Natural Resources Canada (the Client), and in accordance with the methodology, procedures and techniques that SLI used, the assumptions SLI made, and the circumstances and constraints under which SLI carried out its mandate. This document is meant to be read as a whole, and sections or parts thereof should therefore not be read or relied upon out of context.

This document is **NOT** a design manual. Users of this document shall assume full responsibility for the design of facilities and for any action taken as a result of the information contained in this document. SLI and Natural Resources Canada (through the GENCAPD mining project) make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this publication.

1. INTRODUCTION

1.1 General

SNC-LAVALIN ENVIRONMENT INC. (SLEI) was required by the GENCAPD Mining Project to review and revise Guyana Environmental Agency (EPA)'s Guidelines and Checklist for the Preparation of Environmental Impacts Assessment.

1.2 Context

EPA published in November 2000 version 4 of its Environmental Impact Assessment Guidelines. This document is made up of three (3) volumes:

1) Rules and Procedures for Conducting and Reviewing EIAs.
2) Generic.
3) Mining (version 1).

Volume 1 also contains a checklist for EIA review.

1.3 Methodology

The present review will focus essentially on Volumes 1 and 3 where we have found a greater need for improvement. The Guidelines are an excellent document, very concise and straightforward and the recommendations made by SLEI are intended chiefly to polish it and make it more amenable to Guyana's mining context.

2. SUGGESTED IMPROVEMENTS

2.1 Impact rating system

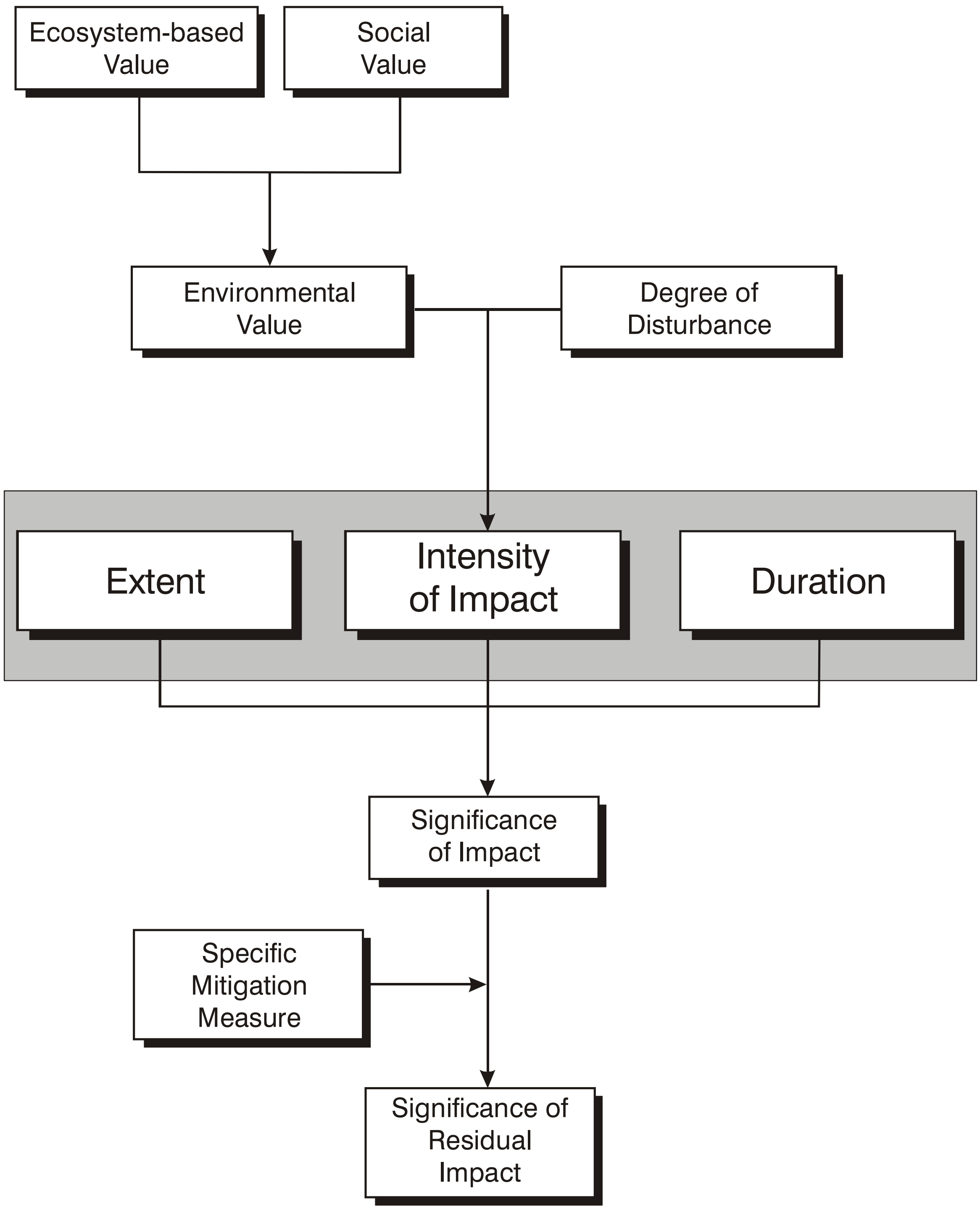
An Environmental Impacts Assessment means exactly that: assessing impacts. An analytical framework should be provided to guide the practitioner as well as the reviewing board in the determination of the magnitude and importance of the impacts on the varied environmental components. EPA guidelines do not contain such a framework. The checklist asks if the impacts were assigned a significance and if the magnitudes were estimated but no guidance is provided as to how these parameters are evaluated.

To fill that void, we recommend the following approach to impact assessment.

2.1.1 Impact Assessment

The methodological approach used to assess environmental impacts measures the **intensity**, the **extent** and the **duration** of the anticipated positive or negative impact. These three qualifiers are grouped under one indicator-synthesis, the **impact significance**. This indicator allows to make an overall judgment on the effects anticipated for a given component, following intervention on the environment. Figure 2-1 schematically presents the basic process leading to assessment of the impact significance.

Figure 2-1
Impact Assessment Approach



Although the impacts of a project on the physical environment are described and quantified as accurately as possible, their treatment differs from that of biological or human impacts, since physical impacts cannot be assigned a value in and of themselves. Therefore, a value can only be assigned to a change in water quality, for example, through the effects that this change will have on the biological and human components, and not through the waters intrinsic value. The effects of the changes on the physical environment serve as input in the assessment of disturbances to the biological or human environments, and as such, deserve particular attention.

2.1.1.1 Intensity of the Impact

The **intensity of an impact** expresses the relative importance of consequences attributable to a component's change. It integrates the **environmental value** of the component, for its <u>ecosystem-based value</u> and <u>social value</u> equally when relevant. It also takes into account the scope of the changes to the structural and functional characteristics of the component (**degree of disturbance**).

The <u>ecosystem-based value</u> expresses the relative importance of a component on the basis of its interest for the ecosystem (function or role, representativeness, patterns of frequentation, diversity, rarity or uniqueness) and its qualities (dynamism and potential). This value calls upon the judgment of specialists following a systematic analysis of the environmental components characteristics.

The **ecosystem-based value** of a given component is considered:

- **High**, when the component is of major interest in terms of it's ecosystem-based function or its biodiversity and exceptional qualities and there is a consensus in the scientific community that it should be conserved or protected.

- **Medium,** when the component is of strong interest and recognized qualities, and there is concern, although not consensus, for its conservation or protection.

- **Low**, when the component holds little interest and has few qualities and there is little concern for its conservation and protection.

The social value expresses the relative importance attributed to a component by the public, the different levels of government or any other legislative or regulatory authority. The social value indicates the popular or political desire or will to conserve the integrity or the original character of a component. This will is expressed through the legal protection that the component is accorded or by the concern of the local or regional public for that component.

The **socio-economic value** of a given component is considered:

- **High**, when the component is the object of legislative or regulatory measures (vulnerable or threatened species, conservation park, etc.) or is essential to human activities (ex: potable water).

- **Medium**, when the component is valorized (economic or other value) or used by a significant portion of the concerned population without being protected legally.

- **Low**, when the component is of little concern or is not used by the population.

The environmental value integrates the ecosystem-based value and the social value and retains highest of the two values as shown in the Grid for Determination of Environmental Value.

Table 2-1
Grid for Determination of Environmental Value

Social Value	**Ecosystem-based value**		
	High	**Medium**	**Low**
High	High	High	High
Medium	High	Medium	Medium
Low	High	Medium	Low

The **degree of disturbance** for a component defines the scope of the changes that affect the component under study given its sensitivity to the proposed project. The changes for a given component may be negative or positive and the effect on the environmental component may be direct or indirect. The cumulative, synergic or delayed impacts, beyond the simple relation of cause and effect, could amplify the degree of disturbance of an environmental component when the environment is especially fragile and therefore must be considered. The degree of disturbance is:

- **High**, when an impact questions the integrity of the affected environmental component, strongly and irreversibly impairs the component or restricts its use in a significant way.

- **Medium**, when the impact reduces or increases the quality or the use of the environmental component affected, without, however, compromising its integrity.

- **Low**, when the impact affects the quality, use or integrity of the environmental component in a way that is barely perceptible.

- **Undetermined** when it is impossible to assess how and to what extent the component will be affected. When the degree of disturbance is undetermined, impact assessment cannot be completed for a given component.

The intensity of the impact, ranging from very high to low, results from the interaction in the three degrees of disturbance (high, medium and low) and the three classes of environmental value (great, medium and low). The Grid for Determination of Impact Intensity shows the different combinations considered.

Table 2-2
Grid for Determination of Impact Intensity

Degree of Disturbance	Environmental Value		
	High	**Medium**	**Low**
High	Very high	High	Medium
Medium	High	Medium	Low
Low	Medium	Low	Low*

* This intensity should be qualified as "very low" to respect the grid logic, but to limit the number of categories this class has been replace by low. This leads to an overestimation of the impact intensity of these components, but the overall consequences are negligible.

2.1.1.2 Extent of the Impact

The extent of the impact expresses the span or the spatial influence of the effects produced by an intervention in the environment. This refers either to a distance or to a surface on which a component will undergo changes. It could also refer to the portion of the population that will be affected by the changes.

The three levels considered to quantify the extent of an impact are:

- The **regional** extent: when an impact affects a vast space or a number of components located at a significant distance from the project, or when it is experienced by the entire population in the study area or by a significant portion of the population in the receiving region.

- The **local** extent: when the impact affects a relatively restricted space or a certain number of components located within, near or at a certain distance from the project site, or when it is experienced by a limited portion of the population in the study area.

- **Site-specific** extent: when the impact affects only a very restricted space or a component within or in the proximity of the project site, or is experienced only by a small number of individuals in the study area.

2.1.1.3 Duration of the Impact

The duration of the impact specifies the temporal dimension, or the period of time during which a component will undergo changes. The duration is not necessarily equivalent to the period of time during which the direct source of impact is active and must take into consideration the frequency when the impact is intermittent. The method used distinguishes between the impacts of:

- **Long duration**: the effects of which are experienced continuously for the duration of the life of the facility, or even beyond.

- **Medium duration**: the effects of which are experienced over a relatively prolonged period of time, but less than the duration of the life of the facilities.

- **Short duration**: the effects of which are experienced over a limited period of time, generally corresponding to the period of construction of the facilities, the start-up period, a season, etc.

2.1.2 Significance of the Impact

The interaction between the intensity, the extent and duration makes it possible to define the **significance of the impact** affecting a component modified by the project. This analysis should consider the level of uncertainty of the assessment and the probability that the impact will occur. The Grid for Determination of Impact Significance, below, differentiates between five levels of significance, ranging from very high to very low.

Table 2-3
Grid for Determination of Impact Significance

Intensity	Extent	Duration	Significance
Very high	Regional	Long Medium Short	Very high Very high Very high
	Local	Long Medium Short	Very high Very high High
	Site-specific	Long Medium Short	Very high High High
High	Regional	Long Medium Short	Very high High High
	Local	Long Medium Short	High High Medium
	Site-specific	Long Medium Short	High Medium Medium
Medium	Regional	Long Medium Short	High Medium Medium
	Local	Long Medium Short	Medium Medium Low
	Site-specific	Long Medium Short	Medium Low Low
Low	Regional	Long Medium Short	Medium Low Low
	Local	Long Medium Short	Low Low Very low
	Site-specific	Long Medium Short	Low Very low Very low

The relative importance of each impact is assessed, taking into account the general mitigation measures integrated into the project. Those measures are applied systematically to the project implementation. For example, if it is stated that the forest is protected near the watercourses, it is assumed that the forest will be untouched wherever there will be activities near the watercourses. Those impacts for which the general mitigation measures have reduced the significance to the point of rendering them negligible are therefore excluded from the analysis. Once the relative significance of the impact is established, it is then described and the application of specific mitigation measures are proposed in order to allow optimal integration of the project into the environment.

The final assessment phase consists of determining the residual significance of the impact after the mitigation measures have been taken in consideration. The issue here, then, is to clarify how the mitigation measure changes one or several of the inputs in the impact assessment process described above.

Activity $\Rightarrow$ Impact

Impact **-** Mitigation Measure(s) **=** Residual Impact

The pathway leading to the impact assessment of each environmental component affected by the project is synthesized in chart form in Appendix A.

2.2 Assessing small actions and their cumulative effects

The majority of applications submitted to regulatory agencies for approval are for actions that do not require a detailed assessment and preparation of a formal EIA report. These actions are subject to a cursory or screening level review because they are relatively small in size and cause predictable and mitigable effects. Many small actions within the same area (as in placer mining) have the potential to cause cumulative (nibbling) effects. This often happens, for example, when many developments occur in rapid succession (e.g., a resource use boom). These types of actions may cause far more cumulative effects than one large action in the same area.

For small-scale mining, the Regulatory Body will have to address the cumulative effects of many small operations along a river or within it when reviewing an Application for

Environmental Permit. Almost all CEEA approaches discussed in the literature are intended for assessing large actions (i.e., relatively large in size or with a high likelihood of causing effects at a regional level). It may not always be feasible or necessary for practitioners conducting screening level assessments to carry out these often complex, time consuming and expensive tasks. It is government agencies themselves who often do all or most screenings in response to permit and license applications — some regulatory agencies must process thousands or tens of thousands of applications each year.

Therefore*, there is a need to define a process by which cumulative effects of small actions can be considered at the screening level* that takes into account the limitations of assessing cumulative effects at this level. Considerable work is still required to formalize such processes that are practical and easily implemented by reviewers. We suggest therefore that a section on assessing small actions and their cumulative effects be added to the guidelines (Volume 1).

In essence, addressing cumulative effects in small project screenings involves considering the potential effects that may arise from the project under review in terms of the broader context in which the project would occur. Such an analysis can be done quite effectively by considering three main aspects. First, it is helpful to consider the potential effects of the project under review from the perspective of general trends affecting the Valued Ecosystem Components (e.g., are there currently known trends of concern, such as gradual loss of water quality that could indicate a need to assess more closely the potential for interactions)? Second, would the project occur in an area where numerous other actions have taken place (e.g., for actions of a similar nature that could result in similar types of effects, such as shoreline modifications along a recreational waterway)? Third, are there any overall policies, thresholds or objectives that have been established at a strategic level of decision making that would be relevant (e.g., carrying capacities of local rivers and creeks)?

2.2.1 Elements of a practical design for a screening process

If cumulative effects are to be considered, they must be addressed in a simple and efficient manner that applies simple tests to the action and provides quick answers. The tests must also provide some indication of risk or likelihood of significance to determine if a more detailed review is required. The screener must be able to quickly make decisions; at no point should a screening process leave the screener wondering how to answer a complex question for which resources and time are not available to properly respond.

The following points should be considered when designing an assessment response for a particular agency. The approach should provide:

- A step-by-step process.
- A series of simple question-based criteria for determining rankings (e.g., significance).
- Simple mechanisms to respond to typical CEEA needs such as setting boundaries and identifying other actions.
- A mechanism to support requests for further information both within and outside the agency responsible for the review while ensuring that the screener's knowledge about the type of action and the geographic area can be incorporated.
- Clear, concise questions that do not include terms open to interpretation (e.g., asking "is ecosystem integrity impaired?" would require "integrity" to be explicitly and practically defined).
- A written record to assist in later understanding on what basis decisions were made.
- Clear decision points as to where to go next, including a "bump-up" mechanism (i.e., to move beyond screening to a more detailed level of review).
- A customized response to the types of actions and effects of most concern to the reviewing agency (e.g., focussed on water-related issues for water use licenses) while at the same time identifying the possibility of any indirect effects that may lead to cumulative effects.

Query for assessing small actions

1) Will the action potentially affect ecosystems or VECs that are currently exhibiting trends of concern?

2) Will the action occur in an area where numerous other actions have taken place?

3) Are there any overall policies or plans that establish relevant objectives or criteria to facilitate the adoption of a broader perspective?

2.3 Collective EIAs for small operations on the same catchment

Many small operators lack the financial and technical capabilities to undertake an EIA that may be required when it is suspected that a watershed is at risk of being irreversibly affected by the presence of many small mining operations within its territory. Collective EIAs might offer an interesting alternative. In a collective EIA, costs of the EIA are shared by all operators on the same catchment. The Regulatory Body obtains a study that covers a broader area and hence makes a better decision as to the incremental effect of mines operating in the area.

An interesting experience of collective EIAs was done in 1994 with small-scale miners of Ecuador. That program, called Plan ECO+ demanded the involvement of the Ministry of Energy and Mines, the Proyecto Minería sin Contaminación (Pollution-free mining project)[1] and the small-scale miners Association. Mining stakeholders in Guyana would strongly benefit in learning more about the ECO+ experience.

We believe that a provision for collective EIA should be introduced into the guidelines.

[1] The PMSC was a joint venture between Projekt- Consult GmbH (a German firm) and the CENDA Foundation (an Ecuadorian NGO) and was financially supported by COSUDE, the Swiss Corporation for International Development.

3. AWARENESS OF MINING INSPECTORS

At the time SNC-LAVALIN ENVIRONMENT INC. is finishing its assignment, the Guyana Geology and Mines Commission (GGMC)'s mine inspectors now have at their disposal many tools to enforce regulations and good practices among miners:

- Mining Environmental Regulations (pending enactment).
- 6 Codes of Practices on issues ranging from use of mercury to effluents management and mine reclamation, among others.
- References for implementing the codes of practice in the field.
- Mining Environmental Guidelines.
- EPA guidelines and checklist.

Although there were no specific training intended for the inspectors, some of them were involved in workshops and training conducted by SLEI during its mandate in Guyana. We are convinced that the necessary tools now exist and conditions are favorable to proceed with training of GGMC mine inspectors. Awareness will sink in only through a formal approach.

4. CONCLUSION

Three additions to EPA's Guidelines and Checklist for the Preparation of Environmental Impacts Assessments are recommended:

1) An impact rating system.
2) A process to assess small actions.
3) A provision for collective EIAs for mining operation within the same catchment.

Recommendation 1 would correct the greatest weakness of the guidelines. Recommendations 2 and 3 would enhance the document while making its use friendlier to the Regulatory Body.

Training for mine inspectors should proceed without further delay making use of the tools that were developed during the GENCAPD Mining project.

This report has been prepared par Marc Arpin, M.Sc., P.Geo., project manager and reviewed by Benoit Demers, M.Sc.A., Eng., Director, Mining and Environment.

SNC-LAVALIN ENVIRONMENT INC.

Marc Arpin, M.Sc., P.Geo.
Project Manager

Verified for conformity
with ISO 9001 by : ______________________________

Benoît Demers, M.A.Sc., Eng.
Director
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MA/lj

Distribution:

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APPENDIX A

Impact Assessment Sheet

APPENDIX A

FORM NO.: 1 ***LOCATION:*** ***NAME:***

ENVIRONMENT: ☐ Physical ☐ Biological ☐ Human

AFFECTED COMPONENT:

PROJECT PHASES: ☐ Construction ☐ Operation

IMPACT ORIGIN:

IMPACT DESCRIPTION:

IMPACT ASSESSMENT (biological or human components only):

Nature of impact : ☐ Positive ☐ Negative

ENVIRONMENTAL VALUE

☐ High ☐ Medium ☐ Low

DEGREE OF DISTURBANCE

☐ High ☐ Medium ☐ Low ☐ Ind.

EXTENT

☐ Regional
☐ Local ☐ Immediate

INTENSITY

☐ Very high ☐ High
☐ Medium ☐ Low

DURATION

☐ Long ☐ Medium
☐ Short

IMPACT SIGNIFICANCE

☐ Very High ☐ High ☐ Medium ☐ Low ☐ Very Low ☐ Indeterminate

SPECIFIC MITIGATION MEASURES:

•
•
•
•

RESIDUAL IMPACT SIGNIFICANCE

☐ Very High ☐ High ☐ Medium ☐ Low ☐ Very Low

COMMENTS:

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•