



FRM-1003 Guide 01 Risk Ranking Guide



Approver: FRM Unit Manager	Last Revised: November 15, 2007	Review Date: November 15, 2009
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PURPOSE

- Risk ranking is used to:
 - Estimate relative risks of a set of identified hazards;
 - Allow ranking of risks based on risk scores;
 - Establish a threshold of risk for determining the significance of environmental aspects;
 - Compare the risks of different hazards to establish priorities for risk prevention;
 - Assess the effectiveness of risk prevention solutions by ranking risks before and after the application of prevention measures; and
 - Compare the effectiveness of alternative risk prevention solutions.

APPLICATION

Risk ranking will be used by all Tembec Forest Resource Management - Pine Falls Operations to assess the significance of aspects.

DEFINITIONS

Significant Aspect An aspect with a risk ranking that is in the top 30% of ranking scores in the Environmental Aspects Database. The database automatically calculates this.

INSTRUCTIONS

Risk ranking is a process used to establish a relative standard of risk that can be used to assign “significance” to operations, products or services that have risk consequences.

This simple model uses weighted scoring to rank various risks. It does so in a manner that is internally consistent, but that has no real units of absolute measure (such as financial losses measured in dollars, or safety impacts measured in number of safety incidents over time).

1. What Is Risk Ranking?

Risk ranking is used because:

- It provides a clear record of how risks were calculated (this is provided by the scoring records).
- It requires minimal resources (time, money, analytical skills, etc.).
- It is a simple yet consistent framework and is more likely to be willingly accepted by a diverse group.
- It allows transparency. Value judgments are incorporated in weighted scoring for all to see - that is, the scoring criteria and their relative weights are presented explicitly, and the person or group completing the scoring is compelled to record their judgements.

2. Why Use This Approach?

Risk implies a specific meaning that needs to be clear from the outset, and that needs to be understood as distinct from “hazard”.

Hazard: *a substance, chemical, physical condition, activity or event that has the potential for causing damage to people, property or the environment*

Risk: *a measure of human injury, environmental damage, economic loss or loss of business reputation, that takes into account both incident likelihood and the severity of the consequences.*

As an example, consider the activity of unloading fuel. This activity is a **hazard** since it has the potential to cause damage. This hazard, however, may or may not represent a significant **risk** depending on the **likelihood** of an incident, and the severity, scope and duration of the **consequences**.

3. What Is Risk?

Risk has 3 components: **Exposure**, **Likelihood** and **Consequences**. The formula for calculating risk scores is:

$$R = E \times L \times C$$

1. A **hazard** must be present. This element is referred to as **exposure** when expressed as a frequency (e.g., hydrogen peroxide unloading once a week). If we did not unload this chemical there would be no hazard, and therefore no risk.
2. There is always some finite **likelihood** (chance) that an incident will occur. The likelihood of a spill during chemical unloading is never zero, since equipment failure or human error is always possible.
3. The **consequences** or *potential damage* must also be greater than zero. Even if there is adequate spill prevention, control and containment systems, there will be some consequences –clean up, lost product etc. The magnitude or severity of those consequences are however not as serious as they could be. In this case, risk is minimized, even though the hazard is present.

4. A Formula For Calculating Risk

There are four broad categories of Consequences:

- Environmental Impacts **(C1)**
- Safety Impacts **(C2)**
- Business Impacts (financial losses) **(C3)**
- Company Reputation Impacts **(C4)**

Each **C**onsequence is scored separately in order to recognize differences between risks. As an example, a hazard may have high environmental impacts but no significant safety impacts. The four **C**onsequences are added before multiplying by **E**xposure and **L**ikelihood:

$$R = E \times L \times (C1+C2+C3+C4)$$

Values for **E**, **L** and **C** are assigned consistently (although somewhat arbitrarily), across all risks by using the Risk Ranking Tables in this Guideline. There are separate tables for woodlands and the mill.

5. Risk Values and Weights

The **values** for **E**xposure, **L**ikelihood and **C**onsequences in the Risk Ranking Tables have been set on an ascending scale. Each increase in value is weighted differently than the previous level. Also in this system **E**xposure, **L**ikelihood and **C**onsequences do not have the same weight. **C**onsequences are given 10 time greater weight in the risk equation. This is because even though an activity may have a low likelihood and exposure, if the potential consequences are severe then it is our (legal) obligation to take action to prevent it nonetheless.

The values and weights for each risk component are listed in the following table.

Risk Component	Value Scale	Weights
Exposure	0 - 10	1
Likelihood	0.1 - 10	1
Consequences	0.25 - 25	Total 10 2.5 for each Consequence

According to our formula, **R**isk is only zero when **E**xposure is zero. The lowest possible score is zero and the highest possible score is 10,000.

Higher scores will result when **C**onsequences are high, rather than when **E**xposure and **L**ikelihood are high, but **C**onsequences are relatively low.

After scoring all of the hazards under consideration, rankings are formulated. The Risk Tables provide guidance in evaluating risk scores. Suggestions for the timing of and need for corrective actions are made based on the risk scores. This guidance is not absolute but may act as a

6. Formulating Rankings

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useful yardstick.

When scoring the environmental consequence of an aspect, there may be many instances when an aspect may rank differently between the 3 environmental criteria (severity, geographic extent and duration). In these cases, pick the highest score of the three criteria when establishing the environmental consequence risk score. For example, the **severity** of a sulfuric acid spill caused by a breach in the sulfuric acid tank outside the mill would be high to extreme severity (score of 10 or 25), but the **geographic extent** is small (score of 2). In this case the environmental consequence would be a 10 or 25.

Risk ranking does not account for uncertainty regarding any of the scores contributing to the overall total. Subjectivity can also affect the values assigned to scores. Having a multidisciplinary team conduct the scoring can reduce uncertainty and subjectivity.

**7.
Addressing
Uncertainty and
Subjectivity**

The team should have a balance of perspectives. Representation from management, finance, engineering, safety, environment, legal, and operations is beneficial.

Scoring can be conducted in two ways. Individuals can perform the ranking and the results may be compiled and averaged to reflect the average group score. In a group with polarized opinions, however, this approach may not be satisfactory. A second approach is to have the group reach consensus on each score assigned. This second approach will likely take more time but the effort invested in reaching consensus will pay dividends in promoting ownership of the results.

RELATED PROCEDURES

[FRM – 1003 Identification of the Significance of Environmental Aspects.](#)

FORMS

[FRM - 1003 - Form 01 Risk Ranking Form 01](#)

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RISK RANKING TABLES

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Exposure		
How frequently does the activity or event take place?		
10	High	Continuous <i>(Occurs throughout the year or daily)</i>
6	Medium - High	Frequent <i>(Occurs intermittently over extended periods or weekly)</i>
3	Medium	Occasional <i>(Occurs seasonally or monthly)</i>
1	Medium - Low	Rare <i>(Occurs over short periods or yearly)</i>
0.5	Low	Very Rare <i>(Occurs only every few years)</i>
0	None	No Exposure

Likelihood		
What is the likelihood of the aspect occurring?		
10	High	Can Happen <i>(Occurs often)</i>
6	Medium- High	Quite Possible <i>(Has occurred before but not often)</i>
3	Medium	Unusual But Possible <i>(Has occurred elsewhere)</i>
1	Medium-Low	Conceivable but very unlikely <i>(Has not yet been known to happen)</i>
0.5	Low	Practically Impossible <i>(Unlikely but not improbable)</i>
0.1	Negligible	Virtually Impossible <i>(Approaches the impossible)</i>

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Consequences – Environmental			
Assessment Factors			Score
Severity	Geographic Extent	Duration	
Extreme <ul style="list-style-type: none"> Lethal acute effect on plants or animals elimination or significant alteration of a resource, habitat or unique and sensitive features loss or severe limitation on multiple use impacts are not mitigable significant cumulative environmental effects significant impacts on STE species severity outside of range of natural variability Indictable legal offence <ul style="list-style-type: none"> Court proceedings, criminal liability 	Very Large <ul style="list-style-type: none"> Impacts at site, stand (local), landscape and trans-boundary scales Multiple ecosystems or ecoregions > 1,000,000 Ha 	Permanent <ul style="list-style-type: none"> Outside natural range of variability for recovery Loss of resource permanently from productive landbase Periodicity / frequency is on-going 	25
High <ul style="list-style-type: none"> Sublethal effects Significant impact on resource, habitat, unique / sensitive features or multiple use but ecological function is maintained within natural range of variability Mitigation strategies available Limited cumulative environmental effects Concern for STE species Summary legal offence <ul style="list-style-type: none"> Court proceeding or environmental orders, moderate fines and penalties. 	Large <ul style="list-style-type: none"> Impacts at site, stand (local) and landscape scales Multiple ecosystems but usually within a single ecoregion 1,000 – 1,000,000 Ha 	Extended Duration <ul style="list-style-type: none"> Recovery possible within natural range of variability given severity of impact Rotation period may be effected Recovery within Free to Grow assessment period (15 years) 	10
Medium <ul style="list-style-type: none"> Slight to intermediate impact on resource, habitat, multiple use, unique and sensitive features No impact on STE species No cumulative environmental effects No detectable effect on ecological function Actionable legal offence <ul style="list-style-type: none"> Warning, administrative penalties, small fines 	Medium <ul style="list-style-type: none"> Impacts at site and stand level (local) 20-1,000 Ha 	Medium Duration <ul style="list-style-type: none"> Recovery within natural range of variability No impact on rotation period Recovery within regeneration survey period (7 years) 	4
Low <ul style="list-style-type: none"> Minor alteration to resource, habitat, multiple use, species Severity within natural range of variability Minor legal violation <ul style="list-style-type: none"> Ticketable offence, warning, minor fines 	Small <ul style="list-style-type: none"> Impacts at site level only 1 – 20 Ha 	Short Duration <ul style="list-style-type: none"> Recovery period well within range of natural variability Recovery in 1 to 2 years 	2
Negligible <ul style="list-style-type: none"> No detectable effect, but some effects may be present Severity well within natural range of variability Technical legal violation <ul style="list-style-type: none"> Theoretical violation typically ignored 	Negligible <ul style="list-style-type: none"> Impact less than 0.5 Ha 	Negligible <ul style="list-style-type: none"> Temporary effect Days to a few months 	1
None			.25

Consequences – Safety	
<i>What are the human health and safety consequences of the activity or event?</i>	
High	25
<ul style="list-style-type: none"> • Death(s) or long term health impacts 	
Medium-High	10
<ul style="list-style-type: none"> • Serious injury or short term health impacts 	
Medium	4
<ul style="list-style-type: none"> • Temporary irritation or disability, 	
Medium- Low	2
<ul style="list-style-type: none"> • Series of minor injuries or complaints 	
Low	1
<ul style="list-style-type: none"> • Minor first aid or irritation 	
None	0.25
<ul style="list-style-type: none"> • Negligible 	

Consequences – Business	
<i>What are the business consequences / financial losses of the activity or event and its aftermath?</i>	
High	25
<ul style="list-style-type: none"> • Loss or damage of over \$1,000,000 • Significant long-term impact on wood cost • Permanent loss of new economic opportunities 	
Medium-High	10
<ul style="list-style-type: none"> • Loss or damage of over \$100,000 • Significant short-term impact on wood cost • Short-term loss or restrictions on development of present and new economic opportunities 	
Medium	4
<ul style="list-style-type: none"> • Loss or damage of over \$10,000 • Slight impact on wood cost • Short-term restrictions on present economic opportunities 	
Medium- Low	2
<ul style="list-style-type: none"> • Loss or damage of over \$1,000 • No effect on wood cost • No restrictions on present and future economic opportunities 	
Low	1
<ul style="list-style-type: none"> • Loss or damage of over \$100 	
None	0.25
<ul style="list-style-type: none"> • None 	

Consequences – Public Opinion / Company Reputation	
<i>What are the impacts on public opinion and Company reputation resulting from the activity or event and its aftermath?</i>	
High	25
<ul style="list-style-type: none"> • Negative national or international news coverage or protests by national or international interest groups or non-governmental organizations (NGOs) due to high resource value • Requires lengthy negotiations and issues may not be resolvable 	
Medium-High	10
<ul style="list-style-type: none"> • Negative local or regional news coverage or protests by local or regional stakeholders, First Nations or non-governmental organizations (NGOs) • Issues resolvable but requires many joint planning sessions or meetings over several months 	
Medium	4
<ul style="list-style-type: none"> • Complaints to outside agencies, regulators and the Company • Issues resolvable in short-term at joint planning or other meetings 	
Medium- Low	2
<ul style="list-style-type: none"> • Complaints to the Company • Issues easily resolved 	
Low	1
<ul style="list-style-type: none"> • Second-hand knowledge of public concern 	
None	0.25
<ul style="list-style-type: none"> • No complaints known 	