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**Description of**  
**Risk Assessment for Geophysical**  
**Operations (Health and Safety and**  
**Environment)**

**Survey Type:**

**Project:**

**Location:**

Date: 12.09.2011

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Risk Assessment Memo:

This Risk Assessment completed by Tomas Grand - last update 12.09.2011

NOT FINAL VERSION

Some missing data must be gathered from client before it will be completed

# **1. INTRODUCTION**

## **1.1 Purpose**

The purpose of this risk assessment is to identify hazards within the proposed survey area and determine their likelihood and severity.

These matrices were developed for land geophysical survey operations and require the use of appropriate manuals, weather information and topographical maps. All supporting documentation used in determining risk factors must be included in the appendix.

Another important part of the risk assessment is to outline expectations to the crew. This could involve production expectations so that in adverse environments the crew does not feel pressure – self induced or otherwise – to push safety guidelines or limits.

## **1.2 Supporting Documentation**

Please attach copies of the following performance charts:

- Any applicable operational manuals
- Any applicable national safety and environmental documentation like laws, licenses, manuals, instructions etc.
- Topographic maps
- Emergency contact list and number

### **1.2.1 Additional Documentation:**

- Temperature, daylight and weather statistics for survey area
- Orientation plan/map for survey area and survey lines or stations (should be handed to the crew chief)
- Fuel handling / quality control procedures (another handout given to field crew)
- Additional training course material relevant to survey area (like high altitude training, survival training etc.)

## 2. SURVEY INFORMATION

### 2.1 Operator Information

Geophysical Operator	
Contact Name	
Phone Number	
Fax Number / email address	
Base of Operations	
Address	
Date of Last Audit	
Auditor	

### 2.2 Customer Information

Customer	
Contact Name	
Phone Number	
Fax Number / email address	
Base of Operations	
Address	
Date of Last Audit	
Auditor	

### 2.3 Contractor / Sub-contractor Information

Local hired sub-contractor	
Contact Name	
Phone Number	
Fax Number / email address	
Base of Operations	
Address	
Date of Last Audit	
Auditor	

## 2.4 Vehicle (truck, boat, aircraft) Information - if applicable

Model	
Manufacturer and Owner	
Registration #	
Serial Number	
Year of fabrication	
Total Time Frame	
Total Time Engine	
Type of Engine	
Allowed operational load	
Fuel information - type, load, reserves	
Speed information ( base to field speed, speed in the field during operations)	
Endurance in Survey Mode	
Base of Operation	
Equipment List (safety, survival, special markings , maintenance , spares)	
Maintenance Information	
Major Components Requiring Change Or other required modifications required for survey	

## 2.5 Survey Area

Block Name		
Block geographic coordinates		
Include polygon vertexes		
Survey Type to be conducted on this block		
Survey Lines	Direction	
	Spacing	
	Average Length	
	Total line length (lkm)	
Stations	Spacing / distance	
	Drilling required ? depth	
	Stabilization required ; type	
	Marking , cutting required ?	
Type of transportation to survey block		
Type of transportation or move on lines/stations		
Distance to operation base		
Distance to closest settlement / populated area		
Distance to closest airport		
Distance to closest SAR, MEDIVAC, Fire Service, police		
Special Requirements (List specifications like ground speeds, tolerances, temperatures, weights, etc.) for this block:		
Remarks:		

## 2.6 Operating Conditions

Block Name		
Weather	Prevailing wind Direction	
	Avg. wind speed (knots)	
	Mean min temp ( C )	
	Mean max temp ( C )	
	Remarks	
Elevation Feet(AMSL)	Minimum	
	Median	
	Maximum	
Accommodation (Hotel, house, camp, etc)		
Type of vegetation, surface cover		
Landing site details (airport, helipad, etc)		
Survey Control Service on site ? (ATC, SAR, rangers etc.)		
Type of navigation in the field		
Services (Crash, fire, rescue, hangar) available on site ?		
Fuel Supplier Name - location - distance to closest gas station		
Fuel Storage / Delivery method		
(tanker, buried tanks, bladder, drums?)		
Type of fuel storage and refueling control		
Type of remediation in case of environmental impact		
Is use of active electricity sources or EM field sources involved ?		
Type, power, voltage		
Type of corrective actions to avoid impact on crew, community and environment		
Is use of radioactive sources involved ?		
Type, activity, licenses for use		
Type of corrective actions to avoid impact on crew, community and environment		
Is use of other chemicals involved ?		
Type, licenses for use		
Type of corrective actions to avoid impact on crew, community and environment		
Is use of blasting involved?		

Type, licenses for use Type of corrective actions to avoid impact on crew, community and environment	
Is vegetation cutting and station marking / stabilization involved Type, licenses for use Type of corrective actions to avoid impact on community and environment	
Survey Following Method (radios, GPS)	AFF – SkyTEm GSM/GPS
Other / Remarks:	



## 2.7 Geography and Hazards

Block Name					
Terrain Gradient	% of block	Surface %	% of block		
Flat (< 10) m/km (< 60) ft/nm		Water			
Rolling (11-50) m/km (61-300) ft/nm		Desert			
Moderate (51-150) m/km (302-900) ft.nm		Scrub			
Rugged (>150) m/km (>900) ft/nm		Pastoral			
Total (must be 100)		Wooded		Tree height	
<b>Hazards</b>					
Rocks, cliffs, slides					
Water – lakes, swamp, rivers, creeks					
Dangerous animals					
Insects and poison danger					
terrorism, theft, human charge					
Remarkable cultural and religious aspects					
Towers/Masts/Windmills					
Powerlines					
Known bird activity					
aircrafts					
Livestock					
Farm houses					
Airstrips					
Blasting areas					
Restricted/Danger areas					
Politically sensitive					
International Borders					
Other hazards/comments:					

### 3. RISK ASSESSMENT

#### 3.1 Risk Matrix – List of Hazards

General Hazards must be considered in any risk analysis regardless of survey size . The information collated in the previous pages is to be used in assigning an appropriate severity and exposure factors by assessing the presence or absence of the hazards listed below.

**HAZARDS-** *not listed in any particular order; add more to the list as appropriate; number each hazard which is present for the block being considered*

ALL BLOCKS COMBINED		
1	Steep mountainous terrain - rocks, cliffs, slides	
2	Ridge crossings at sharp angles (ie. greater than 45 degrees)	
3	Persistent strong winds particularly when combined with significant terrain relief	
4	High altitude (above 1,500 m ASL)	
5	Rapidly variable local weather conditions (eg. fog, low cloud, low visibility)	
6	Extreme weather conditions – high/low temperature, storm, lightning, blizzard, snow, ice	
7	Thick high vegetation - jungle, high forest, thick bush	
8	Poor conditions for navigation in the field	
9	Significant population of birds – bird protected area	
10	Significant population of dangerous animals	
11	Significant population of dangerous insects, snakes and lizards – poison danger	
12	Presence of cultural or natural reserved areas – permission required – special regime to enter the area	
13	Long distance from survey lines/station to camp, nearest populated area – remote survey location	
14	Transportation to station/line out of used roads and paths required – possible damage on vegetation or other environmental impact anticipated	
15	Busy traffic environment	
16	Use of strong electricity sources and EM fields	
17	Use of blasting during operations	
18	Use of radioactive sources during operations	
19	Line cutting, station stabilization, station marking, drilling on station during operations	
20	Use of other chemicals (salt etc.) during operations	
21	No Survey Following Method applicable	
22	Crossing of lakes, river, creek and swamp	
23	Terrorism, theft, human charge	
24	Livestock, populated areas, farms, houses, crossing roads, lines and rails	
25	Limited local SAR resources	
26	Primitive refuelling facilities (eg. drums)	
27	Primitive maintenance facilities (no workshop or on-site personnel; poor parts availability)	
28	Significant number of man-made obstructions (eg. towers, cables); built-up or populated areas; activities on the ground (eg. blasting)	
29	Long distance driving, survey crew using support vehicle to mobilize/demobilize in general	
30	Environmental factors relating to crew workload and fatigue (eg. very cold or very hot and humid)	
31	Poor accommodations to obtain suitable rest; limited available diet	
32	Limited crew experience on type in similar survey conditions	
33	Foreign operational difficulties (eg. language, customs, religion, cultural aspects etc.)	
34	Time constraints; anticipated client pressure to complete survey	

35	Potential interpersonal conflict between field crew members	
36	Poor personal security at operating base	
37	Security concerns in survey area while on survey	
38	Significant local health risks (eg. malaria)	
39	Operating near international boundaries with hostile neighbouring territories	
40	Requirement to carry local observer (often military)	
41	Obstructions on approach paths - difficult access to survey area	
42	Low probability of surviving	
43	Lack of alternate landing areas for SAR	
44	Other Hazards not identified above:	

Use 0 – if hazard is not anticipated

Use – 1 – if hazard is anticipated

Note: The above hazards may be weighted as considered appropriate (ie. if there is a large number of one type of hazard it could be counted twice.)

## 3.2 Risk Matrix – Evaluation

SEVERITY		EXPOSURE	
5	Assigned when 15 or more of the hazards listed are present	5	Assigned for long duration (greater than 6 weeks) single pilot operations with no rotations planned and only one pilot on site
4	Assigned when 11 to 14 or more of the hazards listed are present	4	Assigned for long duration single pilot operations with no rotation planned but more than one pilot on site
3	Assigned when 7 to 10 or more of the hazards listed are present	3	Assigned for short duration single pilot operations
2	Assigned when 3 to 6 or more of the hazards listed are present	2	Assigned for long duration two pilot operations with no rotation planned
1	Assigned when less than 3 of the hazards listed are present	1	Assigned for short duration two pilot operations

RISK MATRIX					
EXPOSURE	SEVERITY				
	5	4	3	2	1
5					
4					
3					
2					
1					

For each Survey Block enter the figures from the Risk Matrix above to determine the Risk Factor.

	Block Name	Severity	Likelihood	Risk Factor
1				
2				
3				
4				

Use the RISK FACTOR from the table above to determine the risk management required for the proposed survey.

RISK FACTOR	SURVEY CONDITIONS
16-25	<b>Survey not to proceed as currently planned. Consultation between Crew Chief and HSE Manager required to significantly amend plans</b>
9-15	Survey may proceed upon approval by HSE Manager of amendments to current plan or other factors that mitigate identified risks. Where possible on-site start-up visit to be arranged with Client Corrective actions on identified hazards must be defined and implemented by HSE manager and Crew Chief
1-8	Conduct of the survey may be completed in accordance with JSP Corrective actions on identified hazards must be defined and implemented by Crew Chief

## 4. RECOMMENDATIONS AND CORRECTIVE ACTIONS

Use the table below to summarise the main findings of this risk assessment and to highlight any particular areas of concern with recommended controls or corrective actions.

Each identified hazard must be noted, discussed and corrective actions to be defined, described and implemented

### 4.1 Corrective Actions

Block Name	Identified Hazard	Corrective actions