International Airborne Geophysics Safety Association

"SAFETY IN THE AIR BEGINS ON THE GROUND."

IAGSA Member Self Assessment Questionnaire

Company Name: New-Sense Geophysics Ltd.			
Location: Markham, Canada			
Date: 2016-05-16			
Questionnaire completed by: Chris Evans			
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Total # Employees: 8			

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Planning – All Operations			
Title	**Recommendation**	**Compliance Level**	**Comment**
Survey Planning	The following is a list of IAGSA Recommended Practices which all members should take into account when planning airborne survey operations regardless of type of survey or terrain.		
	Prior to commencing a survey, do you conduct a detailed risk assessment which identifies the safe survey height?	☑ Always ☐ Sometimes ☐ Never	In combination with a drape analysis, a ground or air recon (area dependent), is conducted to identify both challenging areas for safe drape, but ground hazards such as cables.
	Prior to conducting a survey do you establish a crew rotation schedule which considers factors such as remoteness of site, severity of climate, quality of accommodation, food and personal considerations?	☑ Always ☐ Sometimes ☐ Never	Typical operations are short duration, but for longer duration, air crew and ground crew have pre-determined schedules, that typically have aircrew and ground crew rotate staggered to aid in project continuity.
	Do you have a minimum temperature limit for cold weather operations?	☐ Always ☑ Sometimes ☐ Never	Most operations are in warmer climates, but low minimum temperature limits are at the discretion of the aircraft operator.
	Do you limit the use of aircraft heaters or air-conditioning in the interest of "clean" data?	☐ Always	Prior to commencement of operations, determined what aircraft systems are required for the environment, either operate entire time or not at

		■ Sometimes ☐ Never	all. If conditions require different configuration, considered out of normal operating environment and not flown.
	Do you require the use of oxygen for all aircrew for survey flights or portions thereof conducted above 10,000 feet ASL?	■ Always ☐ Sometimes ☐ Never	Operations typically with pilot only, but if operator onboard, oxygen required.
	Do you have a drug and alcohol policy?	■ Yes ☐ No	
	Are aircrew members required to wear long trousers or a flight suit, closed shoes, have gloves available and clothing appropriate for the environmental conditions?	■ Always ☐ Sometimes ☐ Never	
	For fixed wing surveys, is a risk assessment conducted to determine whether or not helmets should be worn by the flight crew members?	■ Always ☐ Sometimes ☐ Never	
	For helicopter surveys, are the flight crew members required	■ Always	Both pilot and operator (if on flight) are required.

	to wear a flight helmet?	☐ Sometimes ☐ Never	
	Are flight crew members paid or given an incentive based upon hours or kilometers flown?	☐ Always ☐ Sometimes ■ Never	
Emergency Response Planning	Do you develop project specific emergency response plans for each project?	■ Always ☐ Sometimes ☐ Never	ERP constructed for each project in conjunction with client, and aircraft operator. ERP posted and available for all project members on the project dashboard prior to survey operations.
	Does your company have an overall crisis management plan?	■ Yes ☐ No	
Flight Following	Do you operate a satellite tracking system on all aircraft?	■ Always ☐ Sometimes ☐ Never	Do not own aircraft, but install our out system which maybe in conjunction with operators additional system.
	Is the position reporting frequency of the tracking system set to 2 minute	■ Yes	2 min normal operation, 5-6 sec (typical) for emergency

	intervals as a minimum?	☐ No	
Single Pilot Only Surveys	Do you conduct single Pilot Only Surveys (no equipment operator)?	☐ Always ☒ Sometimes ☐ Never	Operator typically on board only during calibrations and training flights. On occasion, second crew member on board for hazard flagging.
	If so, does the Pilot have equipment operation duties in addition to those normally associated with flying the aircraft?	☐ Always ☐ Sometimes ☒ Never	System is automatic, with predetermined and established flight plan.
	Are additional risks associated with single pilot only operations detailed in the risk assessment?	☒ Always ☐ Sometimes ☐ Never	
Operating Standards			
Minimum safe survey speeds	Are minimum safe survey speeds for single engine aircraft calculated at 130% of clean stall speed (Vs)?	☐ Always ☒ Sometimes ☐ Never	For all fixed wing operations, helicopter operations require more developed approach.
	Are minimum safe survey speeds for Multi-engine	☒ Always	

	aircraft: 110% of best single engine rate of climb speed (Vyse), or minimum safe single engine speed (Vsse, if published)?	☐ Sometimes ☐ Never	
Minimum Fuel Standard	Is fuel planning for survey flights based upon 110% of planned consumption?	☐ Always ☐ Sometimes ☐ Never	Typically calculated based on sea level operations, typical environments are at high altitude which exceed 10% efficiency increase.
	Is minimum reserve fuel calculated as 30 minutes for fixed wing and 20 minutes for helicopter at normal cruise consumption rates?	☐ Always ☐ Sometimes ☐ Never	
	Do planned minimum fuel reserves consider site specific contingencies?	☐ Always ☐ Sometimes ☐ Never	
Flight and Duty Times	Are the following Flight & Duty Times adhered to?		Yes, managed and tracked through project dashboard.
	A maximum of 5 hours (excluding transit time) per flight for a single pilot operation	☐ Always ☐ Sometimes	

		☐ Never	
	A maximum of 8 hours (excluding transit time) per flight for a two pilot operation	■ Always ☐ Sometimes ☐ Never	
	40 hours in any 7 consecutive day period	■ Always ☐ Sometimes ☐ Never	
	70 hours in any 14 consecutive day period	■ Always ☐ Sometimes ☐ Never	
	120 hours in any 30 consecutive day period	■ Always ☐ Sometimes ☐ Never	
	1200 hours in any calendar year	☐ Always	Not tracked, as operations using a variety of aircraft providers, pilots not on staff.

		■ Sometimes ☐ Never	
	The maximum duty time in any one day shall not exceed 14 hours	■ Always ☐ Sometimes ☐ Never	
	The maximum duty time shall not exceed 60 hours in any 7 consecutive day period	■ Always ☐ Sometimes ☐ Never	
	The pilot shall have a minimum of 2 days rest within a 14 day period. These may be taken separately or together. If taken separately, one day rest shall be defined as 30 consecutive hours free from duty.	■ Always ☐ Sometimes ☐ Never	
Emergency Beacon / Radio	Is each aircrew member required to carry on their person essential survival items including: a personal locator beacon means to start a fire,	☐ Always ■ Sometimes	Typically located in single location accessible to any crew on board.

	knife and a signal mirror?	☐ Never	
Fuel Quality Control – Storage Tanks	The quality control of the fuel varies considerably at smaller centres. The crew must determine the adequacy of this quality control and take all available means to ensure against boarding contaminated fuel. Is there a procedure in place to ensure that the following checks are required anytime a fuel source is unknown or questionable:		
	Check that Fuel Quality Control Check and Delivery documents are current and available.	☑ Always ☐ Sometimes ☐ Never	Conducted by aircraft operator.
	Check that the fuel servicing vehicle / facility is identified with the fuel type handled.	☑ Always ☐ Sometimes ☐ Never	
	Check that the facility is clean and maintained.	☑ Always ☐ Sometimes ☐ Never	
	Check that bonding wires and connections are in good condition.	☑ Always ☐ Sometimes	

		☐ Never	
	Check that filter systems are in place and date of last element replacement.	☐ Always ☑ Sometimes ☐ Never	Yes on remote operations, if out of major established airport, often no access
	Check that a sample is clear and bright downstream of the filter.	☑ Always ☐ Sometimes ☐ Never	Conducted by aircraft operator.
	Request or conduct a water test with paste or syringe and capsules.	☑ Always ☐ Sometimes ☐ Never	Conducted by aircraft operator.
	Check that a sample from the low point of the tank is clear bright and free of water. If there is no low point water drain, do a dip of the tank using water paste.	☑ Always ☐ Sometimes ☐ Never	Conducted by aircraft operator.
Fuel Quality Control - Drums	When using drummed fuel are there procedures in place to ensure the following requirements?		

	Verify the expiry date of the drums.	☑ Always ☐ Sometimes ☐ Never	Drums not used unless all other possibilities exhausted.
	A "go no-go" filter be used for all refueling from drums.	☑ Always ☐ Sometimes ☐ Never	Conducted by aircraft operator.
	All drum fuel is visually checked for clarity and color and water tested with paste or fuel syringe and capsules before use.	☑ Always ☐ Sometimes ☐ Never	
	Only clearly branded drums with both seals intact are be used unless the pilot knows the "history" of the drum since the seals were broken and retests the fuel for contamination before use.	☑ Always ☐ Sometimes ☐ Never	
	Aircraft sump drains be checked before the first flight of the day and after each refueling.	☑ Always ☐ Sometimes	Conducted by aircraft operator.

		☐ Never	
	Drums are stored on their sides, clear of the ground with bungs horizontal in an area not subject to flooding. Under-cover storage should be considered if drum stock are to be kept for a long time.	☑ Always ☐ Sometimes ☐ Never	
	When not in use, fuel pumps are protected from water and other contamination.	☑ Always ☐ Sometimes ☐ Never	
	Bungs should be sealed and the drum placed on its side for short term storage (i.e. overnight) of a partially filled drum.	☑ Always ☐ Sometimes ☐ Never	
Night Surveys	Typically, survey flights are conducted at low heights in day VMC, but if the low height is removed coupled with a smooth air requirement, such as for gravity surveys, it may be desirable to conduct night flights. Such flights can be conducted safely as long as there are adequate procedures to prevent a "controlled flight into terrain" CFIT accident. Are procedures in place to ensure the following requirements:		

	Are night surveys flown at least 1000 feet above all obstacles within the operational area and a 10 nautical mile buffer around the operational area? Does the operational area include the maneuvering area for line turns and lead-ins?	☐ Always ☐ Sometimes ☐ Never	N/A – no night flight operations, all operations VFR condititions
	Is a VMC reconnaissance flight performed in each block?	☐ Always ☐ Sometimes ☐ Never	N/A – no night flight operations, all operations VFR condititions
Monitoring of radios	During survey flights, are radios and transponders turned on and selected to the appropriate ATC or flight service frequencies. Additionally, equipment permitting, common air to air and emergency frequencies (121.5MHz) should also be monitored.	☐ Always ☐ Sometimes ☐ Never	
Turning Radius	During straight and level flight there may be a significant margin above the stall speed, however in a steep turn the stall speed may be reached quickly with little warning and a stall in the turn at low level will likely result in a fatal accident.		

	Are all turns at low level limited to a maximum angle of bank of 30 degrees and be done at a constant altitude. Are climbs or descents allowed to be carried out during the turn?	☐ Always ☒ Sometimes ☐ Never	Majority of turns are performed at level height and consistent angle. Terrain gradients outside the block and within the turning radius may require altitude adjustments.
Towed Geophysical Arrays			
Towed Geophysical Arrays – All aircraft types	This section applies to all airborne surveys utilizing geophysical arrays suspended below and/or towed by rotary or fixed wing aircraft.		
	Do you operate towed geophysical arrays?	☐ Yes ☒ No	All operations using fixed mounted gear with STC for aircraft type.
	Does the towed array have an STC/LSTC, engineering order or other similar certificate or statement describing array specifications and flight test data?	☐ Yes ☐ No	N/A
	Is there an Operating Manual for each array?	☐ Yes ☐ No	N/A
	Does the Operating manual identify the maximum safe	☐ Yes	N/A

	operating airspeed for the array?	☐ No	
	Does the Operating Manual contain a parts list and maintenance manual containing the critical design specification for all parts and elements of the array?	☐ Yes ☐ No	N/A
	Does the Operations Manual contain a pre-flight checklist?	☐ Yes ☐ No	N/A
	Does the Operations Manual contain a schedule for routine preventative maintenance, recorded inspections and testing?	☐ Yes ☐ No	N/A
	Is there a procedure in place to ensure that all required maintenance, inspections and testing are up to date prior to job start?	☐ Yes ☐ No	N/A
	Is all maintenance performed by a qualified person endorsed by the manufacturer or operator?	☐ Yes ☐ No	N/A

Towed Geophysical Arrays – Rotary Wing Aircraft	Has the cable weight and length been determined by an aeronautical engineer as to minimize the potential for cable recoil into main and tail rotors following the loss of load?	☐ Yes ☐ No	N/A
	Is there a weak link incorporated into the load bearing cable?	☐ Yes ☐ No	N/A
	Is the weak link located as close as possible to the attachment hook of the helicopter?	☐ Yes ☐ No	N/A
	Has the breaking strain of the weak link been specified by an aeronautical engineer?	☐ Yes ☐ No	N/A
	Is the maximum towed array airspeed and VNE (Velocity Never Exceed) placard placed on the aircraft instrument panel in the Pilot's view?	☐ Yes ☐ No	N/A
	Does the cargo hook arrangement allow the pilot to		N/A

	jettison the load without removing his/her hands from the flight controls? Do procedures include the requirement to test the helicopter cargo hook release mechanism?	☐ Yes ☐ No	
Towed Geophysical Arrays – Fixed Wing	Is the aircraft fitted with a shearing mechanism which can cut the tow cable when the array needs to be jettisoned?	☐ Yes ☐ No	N/A
	Does the tow cable have a breaking strain which minimizes damage to the aircraft in the event the array snagged with ground objects?	☐ Yes ☐ No	N/A
Geophysical Survey Flight Training			
Training and Experience – All Operations	Does your training program contain a syllabus for low level geophysical flight training?	☐ Yes ☒ No	In re-development
	Does the Pilot training syllabus reflect the IAGSA training guidelines?	☒ Yes ☐ No	Being re-developed in conjunction with.
	Are there documented criteria	☒ Yes	Being re-developed

	to assess Pilot competency?	☐ No	
Simulator Training	In addition to the training in the actual aircraft, do pilots, where practical, undergo simulator training in a type specific simulator representing the aircraft being flown on survey? If so, at what frequency?	☐ Always ■ Sometimes ☐ Never	Developed flight simulator that connects open source flight simulator with multiple aircraft platforms and real SRTM terrain representation, connected with navigation system for guidance. Utilize on pilots that have low hours of this type, and no other pilots available.
Overwater and Offshore Surveys			
Minimum requirements for Over water and Off Shore Surveys	The following recommendations apply to all overwater and off shore surveys flown in both fixed wing and rotary wing aircraft.		
Training – Overwater & Offshore Surveys	Is Underwater Escape Training completed within the preceding three years before undertaking the over water or offshore survey.	☐ Always ☐ Sometimes ☐ Never	N/A
	Are Ditching & Emergency Evacuation Procedures reviewed, crew members thoroughly briefed and simulated training to be conducted at the work site prior to the start of all over water or offshore work. This	☐ Always ☐ Sometimes	N/A

	review should include a review of general emergency procedures that could potentially lead to a ditching and a discussion on the significance of sea state/wave height on ditching.	☐ Never	
Training - Off Shore Surveys	In addition to the above items, the following are to be included in offshore training:		
	Does Initial Training consist of a minimum of 10 hours training conducted by a pilot who has a minimum of 100 hours Offshore experience?	☐ Yes ☐ No	N/A
	Does Recurrent Training consist of a minimum of 5 hours training conducted annually by a pilot with the same qualifications as for the initial training: or prior to the start of an Offshore survey if pilot has completed the initial training but has not flown Offshore for more than 90 days?	☐ Yes ☐ No	N/A
	Alternatively, the above experience requirements may be waived if the Operator has		

	in place a competency based training program which includes Offshore operations.		
Type of Aircraft – Over water / Offshore Operations	For an over water/offshore survey in an area with harsh conditions where the odds of surviving a ditching or the exposure that would follow are low then the emphasis must be placed on choosing an aircraft that reduces the probability of a ditching. Whereas, the aircraft criteria may be somewhat less stringent in less harsh conditions where the odds of a successful ditching and rescue are good.		
	For any survey that is over water or offshore in an area where rescue is not likely to occur within an anticipated acceptable exposure time and/or where anticipated sea states would make a successful ditching unlikely, is the use of a multi engine aircraft with performance characteristics such that in the event of an engine failure during an over water survey it can climb from survey height to 500 feet and return to shore or during an offshore survey it can climb from survey height and maintain prolonged flight on the remaining engine(s) to return to a suitable airport at the minimum IFR altitude utilized?	☐ Always ☐ Sometimes ☐ Never	N/A

	Are single engine piston aircraft used for over water/offshore surveys?	☐ Always ☐ Sometimes ☒ Never	
Aircraft equipment – Offshore	Are aircraft equipped with at least the following gyroscopic instruments, each of which must be independent of the others: 2 x attitude indicator; 2 x heading indicator; 2 x turn and slip indicator or turn coordinator?	☐ Yes ☐ No	N/A
	If a second pilot is to be part of the crew, is there a complete second set of basic flight instruments (attitude indicator, gyroscopic heading indicator, turn and slip or turn coordinator airspeed, altimeter, vertical speed) installed at the co-pilot's seating position?	☐ Yes ☐ No	N/A
	Are there at least two (2) independent power sources to drive the gyroscopic		N/A

	instruments? - this may mean two vacuum pumps with all air driven gyroscopes or a mixture of air driven and electric gyroscopes provided loss of one power source leaves operational one set of three gyroscopic instruments (attitude, heading and turn rate indicators)	☐ Yes ☐ No	
	Is there a radio or radar altimeter with a means of alerting the crew when height above the water falls below a minimum safety height selected by the crew? Is there a means of testing the alerting device prior to flight?	☐ Yes ☐ No	N/A
	Is there a minimum of one instantaneous vertical speed indicator (IVSI) to provide an instant alert of descent	☐ Yes ☐ No	N/A
	Do you require the use of weather radar where	☐ Always	N/A

	thunderstorms are present or could be expected?	☐ Sometimes ☐ Never	
	Are Rotary wing aircraft equipped with floatation aids such as "pop-outs floats"?	☐ Always ☐ Sometimes ☐ Never	N/A, but STC compatible with pop out floats.
Emergency Equipment – Offshore Surveys	An upper torso restraint system, with a preference for a four point harness, for each crew member	☐ Yes ☐ No	N/A
	Are aircraft equipped with a 406 MHZ ELT?	☐ Yes ☐ No	N/A
	Is the crew provided a covered life raft with a self erecting canopy that is equipped with a 406 MHZ ELT and normal emergency survival equipment? Does raft should include an inflatable floor for cold water operations?	☐ Yes ☐ No	N/A
	Are constant wear dual		N/A

	chamber life vests that contain an ELT aELT/EPIRB, flares and a signal mirror, worn by each crew member?	☐ Yes ☐ No	
	Are immersion/exposure suits worn if water and air temperatures warrant?	☐ Yes ☐ No	N/A
	Are all helmets and headsets fitted with double disconnect cords?	☐ Yes ☐ No	N/A
Weather – Offshore Surveys	Are Offshore survey flights conducted under VMC with minimums of 5 miles visibility and 1000 foot ceiling in the survey area?	☐ Yes ☐ No	N/A
	Is a thorough weather briefing solicited (if available) and does it should include sea state/wave height and wind maximums in the survey area?	☐ Yes ☐ No	N/A
Additional Training Requirements			
Fire Extinguisher Training	Do all crew members on survey flights, including equipment operators, receive	■ Yes	Completed during installation of aircraft and orientation. Provides aircraft and type specific questions.

	annual training in the use of fire extinguishers in fighting in flight fires?	☐ No	
Survey Crew Resource Management Training	Is Survey Crew Resource Management training provided to all crew members assigned to survey operations including: geophysicists; pilots; equipment operators; maintenance engineers; field technicians and field support staff at intervals not exceeding three years?	■ Yes ☐ No	Likely yes, but unclear at what this entails.
Flight Performance Monitoring			
Performance Monitoring	Is performance parameters, including aircraft speed, height above terrain and drape, periodically reviewed using data collected during surveys?	■ Always ☐ Sometimes ☐ Never	Performance parameters are analyzed on a per flight basis and posted to the project dashboard for both client and internal review. Data is collected utilizing the raw flight data.
	Is the frequency of review such that any discrepancies on a particular survey or by a particular pilot can be identified as early as possible?	■ Always ☐ Sometimes ☐ Never	Review and comparison for each flight available to all project staff typically within 12 hours of each flight. If outlier or discrepancies exist they are investigated on a case by case basis.