REVIEW OF CLASSIFICATION OF THE LEVEL OF IMPACT OF THE ACTIVITY OF GEOPHYSICAL OPERATIONS IN THE OTWAY BASIN, SOUTH AUSTRALIA

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Using the following criteria, the activity of geophysical operations, as described in the "Environmental impact report for seismic operations in the Otway Basin, South Australia" (Roberts 2001), has been assessed as a low impact activity.

ABBREVIATIONS:
H = High certainty;
M = Medium certainty;
L = Low certainty

REFERENCE	TYPE OF IMPACT	EVENT(S)	POTENTIAL CONSEQUENCES	PREDICTABILITY						MANAGEABILITY							COMMENTS	Environmental significance
				SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE		
	Natural Environment Impacts ***Soil Impacts***																	

				PREDICTABILITY						MANAGEABILITY								
REFERENCE	TYPE OF IMPACT	EVENT(S)	POTENTIAL CONSEQUENCES	SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE	COMMENTS	**Environmental significance**
SEO p. 3, 10, 11 & 13; EIR p. 16, 22, 24, 31, 36 & 37		Seismic line, access track and camp site preparation and restoration - movement/exposure of soils	Soil erosion and/or compaction; bogging	H	M	H	H	M	2	No	Med	Short	Small	Some	Med	2	Management strategies include: - Minimal line clearance using slashing/rolling techniques are employed, resulting in the retaining of rootstock; - In sensitive or densely vegetated areas other line celaring techniques with even less impact can be used; - reforming road side edges at road/seismic line intersections; - maintaining significant or creek bed vegetation; - extra considerations made and alternative preparation techniques implemented in wetland areas (i.e. the use of hand held equipment to remove the need for vehicle access); and - when applicable, previously established survey tracks utilised for access or survey lines.	Low
SEO p. 3, 10, 11 & 13; EIR p. 16, 22, 24, 31, 36 & 37		Movement of vehicles along seismic lines and access tracks	Soil erosion and/or compaction (wheel tracks, ruts and dust generation).	H	H	H	H	H	1	No	Med	Short	Small	Some	Med	2	Effects are minimised by using established tracks and prohibiting off-line driving, particularly when driving in wet conditions. Management procedures include ripping compacted areas and using all detours and doglegs. Susceptible areas and ground deemed unconducive to support heavy vehicles are avoided.	Low
SEO p. 3, 10, 11 & 13; EIR p. 16, 23, 24, 25 & 31		Line surveying and recording	Soil erosion and/or compaction	H	M	H	H	H	2	No	Med	Short	Small	Some	Med	2	Effects are minimised by using established tracks and prohibiting off-line driving and driving when wet. Existing wheel tracks are not followed.	Low

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				SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE		
SEO p. 3, 10 & 11; EIR 24, 32, 33, 36 & 37		Fuel, oil and other contaminant spills	Contamination of soils	H	H	H	H	H	1	N	Low	Short	Small	Small	Low	1	Immediate clean up and remediation. Spill kits readily available. Refuelling only takes place in designated areas where any spills are easily confined; therefore the volume of other spills is likely to be minimal.	Low
SEO p. 3, 10 & 11; EIR 24, 32, 33, 36 & 37		Storage and transportation of domestic wastes/wastewater and sewerage	Contamination of soils	H	H	H	H	H	1	Y	Low	Short	Small	Small	Low	1	In the Otway Basin accommodation facilities in townships are normally used to house geophysical crews. However when a campsite is established, all solid wastes collected in one area of campsite in suitably covered bins. Minimum amounts of waste planned to be generated and will be later removed. Recycling occurs. Chemical toilets are used for basic treatment at all camp sites and taken by truck to a designated sewerage disposal point.	Low
SEO p. 3, 10, 11 & 13; EIR 24, 32, 33, 36 & 37		Disposal and storage of waste - uphole drilling muds	Contamination of soils	H	H	H	H	H	1	N	Low	Short	Small	Small	Low	1	Non-toxic muds used. Drill holes are backfilled with the cuttings. Any excess cuttings are either collected and disposed at an authorised facility or are pigmented to match the surrounding terrain.	Low
	Air																	
SEO p. 3 & 12; EIR p. 24 & 25		Burning of wastes	Localised air pollution	H	H	H	H	H	1	Y	Low	Short	Small	Small	Low	1	No burning of wastes shall be undertaken as dumping facilities are available throughout the Otway Basin. (NB In the Otway Basin accommodation facilities in townships are normally used.)	Low
SEO p. 3 & 12; EIR p. 23, 24, 32,		Movement of vehicles along seismic lines and	Rising of dust	H	H	H	H	H	1	Y	Low	Short	Small	Small	Low	1	Susceptible tracks are avoided. Vehicles travel at slow speeds near homesteads and associated	Low

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				SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE		
36 & 37		tracks															infrastructure etc.	
	Surface Water Impacts																	
SEO p. 3, 10 & 13; EIR p. 13, 24, 34 & 36		Seismic line and access track preparation	Disturbance to watercourse (or other form of natural or human-made drainage) and/or flow	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	In the Otway Basin accommodation facilities in townships are normally used. Campsites -if used- are selected in clear areas which are away from water courses. No ground preparation carried out for campsites.	Low
SEO p. 3, 10 & 13; EIR p.		Fuel, oil and other contaminant spills	Pollution of surface waters, including sensitive wetlands	H	H	H	H	H	1	Y	Low	Short	Small	None	Low	1	Appropriate procedures and guidelines include: - fuel, oil and contaminant spills treated immediately with spill kits; - if appropriate, ground is ripped; and - refuelling points enclosed in designated areas, away from water courses. Incidents are likely to be of a small scale.	Low
	Groundwater Impacts																	
SEO p. 3, 10 & 11; EIR p. 13, 24, 25, 34 & 37		Storage and transportation of domestic wastes/wastewater and sewerage	Localised contamination of groundwater	H	H	H	H	H	1	Y	Low	Short	Small	Some	Low	1	Appropriate procedures and guidelines include: - minimise generation of waste; - providing of suitable covered bins; and - all loads of rubbish leaving camps covered to ensure no spillage; (NB In the Otway Basin accommodation facilities in townships are normally used)	Low

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REFERENCE	TYPE OF IMPACT	EVENT(S)	POTENTIAL CONSEQUENCES	SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE	COMMENTS	**Environmental significance**
SEO p. 3, 10 & 11; EIR p. 13, 24, 25, 32, 34, 36, 37		Fuel, oil and other contaminant spills	Localised contamination of groundwater	H	H	H	H	H	1	Y	Low	Short	Small	Some	Low	1	Appropriate procedures and guidelines include: - fuel, oil and contaminant spills treated immediately with spill kits; - relevant grounds ripped; and - refuelling stations enclosed in designated areas. Incidents are likely to be of a small scale.	Low
SEO p. 3, 10, 11 & 13; EIR p. 13, 24, 29, 31, 34, 35 & 37		Uphole drilling through artesian aquifers	Uncontrolled discharge of groundwater	H	H	H	H	H	1	Y	Low	Short	Small	None	Low	1	Priority is to engage drillers experienced in recognising Dilwyn Formation. Concrete plug immediately placed if formation intersected - standard procedures followed. Consultation with relevant officers and/or hydrogeologists takes place and Dilwyn formation depth maps used in planning uphole survey. Continuous monitoring is required to ensure its effectiveness.	Low
	Flora Impacts																	
SEO p. 3, 6, 9, 11 & 13; EIR p. 20 & 33		Movement of vehicles and allied foot traffic	Introduction and spread of weed species, diseases and pathogens	M	M	M	H	M	2	Y	Low	Long	Small	Many	Med	3	All vehicles and equipment are washed down prior to entering the Otway Basin or before leaving known infested locations within the Basin itself. Weed and disease management strategies are to be developed by operators and control measures put in place.	Low
SEO p. 3, 6, 9 & 13; EIR p. 20 & 33		Fuel, oil and other contaminant spills	Vegetation damage and/or loss; impacts on species diversity	H	H	H	H	M	1	N	Low	Short	Small	Some	Med	2	Appropriate procedures and guidelines include: - fuel, oil and contaminant spills treated immediately with spill kits; - where appropriate ground is ripped; and - refuelling stations enclosed in	Low

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				SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE		
																	designated and bunded areas on well drained ground. Incidents are likely to be of a small scale.	
SEO p. 3, 6, 9 & 13; EIR p. 10, 20, 33 & 37		Seismic line and access track preparation and restoration	Vegetation damage and/or loss; impacts on species diversity	M	H	H	H	M	1	N	Med	Med	Med	Some	Med	3	Appropriate procedures include - avoiding significant vegetation and threatened species; - trim (brush cut) rather than Hydro-ax slash vegetation in sensitive areas (such as wetlands); - cables hand carried through narrow strips of vegetation; - no blading, leaving topsoil, rootstock and seedbanks in place; - facilitate regrowth by respreading mulched vegetation over site; - facilitate regrowth by ripping compacted areas; and - wheel ruts infilled and tracks resmoothed.	Low
SEO p. 3, 6, 9 & 13; EIR p. 10, 20, 33 & 37		Movement of vehicles	Vegetation damage and/or loss; impacts on species diversity	H	H	H	H	H	1	N	Med	Med	Med	Some	Med	3	Drive only on designated areas (ie lease and access tracks). Areas of vegetation (for habitats) avoided as much as possible.	Low
SEO p. 3, 6, 9, 11 & 13; EIR p. 19, 20, 24 & 33		Campsite preparation and site access	Vegetation damage and/or loss; impacts on species diversity	H	H	H	H	H	1	Y	Low	Short	Small	Small	Low	1	Campsites are selected in clear areas which are naturally devoid of vegetation. Site access impacts are reduced by locating sites adjacent to established tracks and using only these for access.(NB In the Otway Basin accommodation facilities in townships are normally used)	Low

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	Fauna Impacts																	
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Seismic line and access track preparation	Disturbance, injury or loss of fauna	H	H	H	M	M	1	N	Low	Short	Small	None	Low	1	Drive only on designated areas (ie lease and access tracks). Areas of vegetation (for habitats) avoided as much as possible.	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Movement of heavy vehicles (including campsite moves)	Disturbance, injury or loss of fauna	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	Drive only on designated areas (ie lease and access tracks). Areas of vegetation (for habitats) avoided as much as possible.	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Movement of heavy vehicles (including campsite moves)	Loss of faunal habitat	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	Drive only on designated areas (ie lease and access tracks). Areas of vegetation (for habitats) avoided as much as possible.	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Campsite preparation and site access	Disturbance, injury or loss of fauna	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	Campsites should be located at least 1 km from stock watering holes to minimise interaction/contact with stock. Camps must not be located near watercourses, creeks or other surface water bodies to minimise interaction/contact with associated fauna. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Storage and transportation of domestic wastes	Scavenging by pest and native species	H	H	H	H	H	1	Y	Low	Short	Small	Some	Low	1	Appropriate procedures and guidelines include: - minimise generation of waste; - providing of suitable covered bins; - all loads of rubbish leaving camps covered to ensure no spillage; and - all other wastes managed effectively. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low

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SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Storage and transportation of domestic wastes	Pest outbreaks	H	M	M	H	H	1	Y	Low	Short	Small	Some	Low	1	Appropriate procedures and guidelines include: - minimise generation of waste; - providing of suitable covered bins; - all loads of rubbish leaving camps covered to ensure no spillage; and - all other wastes managed effectively. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Fuel, oil and other contaminant spills	Access to contaminants by fauna	H	H	H	H	H	1	Y	Low	Short	Small	None	Low	1	Appropriate procedures and guidelines include: - fuel, oil and contaminant spills treated immediately with spill kits; - relevant grounds ripped; and - refuelling stations enclosed in designated areas away from water courses. Incidents are likely to be of a small scale.	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Uphole drilling and logging	Injury or loss of fauna	H	H	H	H	M	1	Y	Low	Short	Small	None	Low	1	Upholes are backfilled and capped to seal to surface level.	Low
SEO p. 3, 9 & 11; EIR p. 23, 24, 33, 35 & 37		Disposal of uphole cuttings and muds to ground surface	Access to contaminants by fauna	H	H	H	H	M	1	Y	Low	Short	Small	None	Low	1	Non-toxic muds used. Uphole cuttings are primarily returned to hole. Any excess cuttings are collected and disposed of at an authorised location.	Low
	Social Environment *Community Resource Impacts*																	

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SEO p. 3, 12 & 13; EIR p. 19, 24, 25, 28 & 32		Seismic line, access track and camp site preparation and restoration	Damage to third party infrastructure	H	M	H	H	H	1	N	Low	Short	Small	None	Low	1	Minimise any disturbance by careful site selection, including: - driving on designated access tracks only; and - avoiding homesteads, associated buildings, stockyards, airstrips, dams, tanks and irrigation infrastruture etc. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
SEO p. 3, 12 & 13; EIR p. 19, 24, 25, 28, 32, 36 & 37		Movement of vehicles (including camp site moves)	Damage to third party infrastructure, including public roads	H	M	H	H	H	2	N	Low	Short	Small	None	Med	2	Drive only on designated areas (ie lease and access tracks, seismic lines). Lines and tracks are deviated to miss local infrastructure. Survey vehicle use of public roads is usually of a short duration when accessing intersecting seismic lines. If seismic data is acquired along or across a road, the appropriate traffic management safety strategies are implemented. Compensation to be paid for any damage caused. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
SEO p. 3, 12 & 13; EIR p. 19, 24, 25, 28 & 32		Line surveying and recording	Damage to third party infrastructure	H	H	H	H	H	1	N	Low	Short	Small	None	Med	1	Drive only on designated areas (ie lease and access tracks, seismic lines). Lines and tracks are deviated to miss well heads by 30 m. Traffic is detoured around pipelines or are crossed at authorised points only. No vibroseis operation within 20m of buildings.	Low

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SEO p. 3 & 11; EIR p. 16, 23, 31 & 35		Seismic line, access track and camp site preparation and restoration	Loss of visual amenity	H	H	H	H	M	2	N	Low	Med	Small	Some	Med	2	Appropriate procedures and guidelines include: - survey lines are prepared to a width of only 4-5 m; - slashing is the preferred preparation technique; - survey lines include weaves to break line of sight (using established vegetation when applicable).	Low
SEO p. 3 & 11; EIR p. 16, 23, 31 & 35		Uphole drilling and logging	Loss of visual amenity	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	Uphole cuttings are primarily returned to hole. Any excess cuttings are either collected and disposed at an authorised facility.	Low
SEO p. 3 & 11; EIR p. 16, 23, 31 & 35		Litter/rubbish	Loss of visual amenity	H	H	H	H	M	1	Y	Low	Short	Small	None	Low	1	All litter is to be removed from field sites (especially camp sites). (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
	Cultural & Heritage Impacts																	
SEO p. 3 & 11; EIR p. 25, 27, 28, 32, 36 & 37		Disturbance during seismic line and access track preparation and restoration	Damage sites of cultural significance	H	H	H	H	M	2	N	Low	Short	Small	None	Low	1	Cultural heritage surveys are conducted, using experienced anthropologists and people representing the appropriate heritage committees (i.e. Murrapeena and Kungari Committees) to identify sites and duly mark them off to prevent disturbance.-Crews preparing lines and sites are trained to locate any other potential sites found for verification by the appropriate heritage committee/anthropologist.	Low
SEO p. 3 & 11; EIR p. 25, 27, 28, 32, 36 & 37		Campsite preparation	Damage sites of cultural significance	H	H	H	H	M	2	N	Low	Short	Small	None	Low	1	Campsites are located adjacent to previous tracks which were likely to be encompassed in previous cultural heritage surveys. (NB In the Otway	Low

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																	Basin accommodation facilities in townships are normally used)	
SEO p. 3 & 11; EIR p. 25, 27, 28, 32, 36 & 37		Movement of vehicles (including camp site moves)	Damage sites of cultural significance	H	H	H	H	M	2	N	Low	Short	Small	None	Low	1	Access is along prepared lines only which have been altered to avoid cultural heritage sites. At sites of some cultural significance, vehicles are excluded and receiver lines are laid out on foot. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
	Community Health & Safety																	
SEO p. 3 & 12; EIR p. 25, 32 & 36		Movement of vehicles (including camp site moves)	Collisions with other road uses	H	H	H	H	M	2	N	Low	Short	Small	Some	Med	2	Appropriate procedures and guidelines include: - driver training; - road signage; - appropriate approved warning signage will be placed in consultation with the local police; and -adherence to speed limits. If seismic data is acquired along or across a road, the appropriate traffic management safety strategies are implemented. Seismic surveys have had an extremely low incidence of collisions in the Otway Basin with no occurrences in at least the last 17 years. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low

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SEO p. 3 & 12; EIR p. 25, 32 & 36		Seismic line, access track and camp site preparation and restoration	Increased public access to off-road areas along seismic lines with increased risk of road accidents	H	H	H	H	H	1	N	Low	Short	Small	Some	Low	1	Appropriate procedures and guidelines include: - seismic lines intersecting public access roads are disguised by use of doglegs or vegetation communities are used as screens; - shoulders are reinstated after work has been completed; and - where appropriate, lines adjacent to public roads blocked off with timber obstructions. (NB In the Otway Basin accommodation facilities in townships are normally used)	Low
SEO p. 3 & 12; EIR p. 25, 32 & 36		Fuel and oil spills from tankers carrying fuel to campsites	Danger to health and safety of employees and public	H	H	H	H	H	1	N	Low	Short	Small	Some	Low	1	Correct transportation procedures are followed. Usually only one tanker used once or twice per survey. Details of management strategy in case of spill. (NB In the Otway Basin accommodation facilities in townships are normally used).	Low
SEO p. 3 & 12; EIR p. 23, 24, 32 & 36		Movement of vehicles around homesteads	Airborne dust and noise generation	H	H	H	H	M	1	N	Low	Short	Small	None	Low	1	Vehicles travel at slow speed in the vicinity of residences and homesteads during reasonable hours.	Low
	Economic Environment ***Existing Land Use Impacts***																	

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SEO p. 3 & 12; EIR p. 25, 32 & 36		Fuel, oil and other contaminant spills	Injury or loss of livestock	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	Appropriate procedures and guidelines include: - fuel, oil and contaminant spills treated immediately with spill kits; - if appropriate relevant ground is ripped; and - refuelling stations enclosed in designated areas on well drained grounds. Incidents are likely to be of a small scale.	Low
SEO p. 3 & 12; EIR p. 25, 32 & 36		Fuel, oil and other contaminant spills	Disruption to land use (eg grazing)	H	H	H	H	H	1	N	Low	Med	Small	Some	Med	2	Appropriate procedures and guidelines include: - fuel, oil and contaminant spills treated immediately with spill kits; - where appropriate, relevant ground is ripped; and - refuelling stations enclosed in designated areas on well drained grounds. Incidents are likely to be of a small scale.	Low
SEO p. 3 & 12; EIR p. 23, 24, 33, 35 & 37		Seismic line, access track and camp site preparation and restoration and other movement of vehicles	Injury or loss of livestock	H	H	H	H	H	1	N	Low	Short	Small	Some	Low	1	Drive only on designated areas (ie lease and access tracks, seismic lines). Campsites are to be located at least 1 km from stock watering holes to minimise interaction/contact with stock. (NB In the Otway Basin accommodation facilities in townships are normally used) The speed of data acquisition averages eight kms per day. Line recording only occurs for a few hours at any specific site with little impact to farming	Low

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																	or significant interference to the land owner. In any case, occupiers will be consulted and notified and, where necessary, be compensated for any deprivation of the use or damage to the land.	
SEO p. 3 & 12; EIR p. 20 & 33		Movement of vehicles (including campsite moves)	Introduction and spread of weed species, diseases and pathogens	M	M	M	H	H	2	N	Low	Long	Med	Many	Med	3	All vehicle and equipment are washed down prior to entering the Otway Basin or before leaving known infested locations within the basin itself. Weed and disease management strategies are to be developed by operators and control measures put in place.	Low
SEO p. 3 & 12; EIR p. 23, 24, 25, 31, 33, 35 & 37		Disposal of uphole drill cuttings and muds to ground surface	Access to livestock to contaminants	H	H	H	H	H	1	N	Low	Short	Small	None	Low	1	Non-toxic muds used. Uphole cuttings are primarily returned to hole. Any excess cuttings are either collected and disposed of at an authorised facility.	Low
SEO p. 3 & 12; EIR p. 23, 25, 32, 36 & 37		General operations	Wildfire initiated by seismic operations	H	H	H	H	H	1	Y	Low	Short	Med	Some	Med	2	Wildfire prevention is a key component in seismic operations with the requirement for comprehensive fire prevention management system to be in place for all operations	Low