

Chapter

9



Health issues and impacts

Chapter 9

Health issues and impacts

The process used to identify and assess the impacts on health involved:

- A review of available health data
- The collection of additional health information by health professionals on Sakhalin Island
- A joint health issue assessment during the HIA workshop (see Appendix 6)

9.1 IDENTIFICATION OF HEALTH ISSUES

In addition to the issues identified in the baseline reports, other health issues were raised during the HIA workshop in January 2002.

The following tables (Table 13 - 17) are a summary of the health issues and impacts on health. They are based on the available health data (eight reports), the health baseline data (three reports plus statistical reports) and issues identified during the HIA workshop.

The original tables were based on the model described by Birley (Ref. 17) and attempted to identify vulnerable groups, contributing environmental factors, the capability of the health services to manage the issue, and the likely health risk related to the Project. During the workshop issues were classified into the following categories:

- Communicable Diseases
- Lifestyle
- Health Services and Facilities
- Non-communicable Diseases
- Public Health

Following feedback and review by several parties within and outside SEIC, these tables were modified in an attempt to consider health determinants and at-risk community groups. This methodology contrasts with the Russian quantitative HIA process which relies on a biomedical model and a numerical risk.

It is important to note that not all the health issues are clinical medical problems but that they can also relate to access to facilities and socio-economic factors. It is apparent that some important health issues are health determinants that relate to the social environment. Additionally there are some health issues, which although important in the community, are not Project health impacts.

Studies in various cultures have shown that many effects on health are influenced by socio-economic factors (Ref. 18). Socio-economic factors can have an impact on nutrition, education, housing and the level of nutrition and education can in turn affect a family's income. The status of the local economy has an effect on community morale and may affect the level of alcohol abuse and violence in the community.

Unlike many projects undertaken in countries with a poor civil and industrial economic infrastructure, the Sakhalin Project is occurring in a nation with a history of strong industrial development, but increasingly challenged by declining funding. Historically the approach to and management of public health and clinical medical care in Russia differs significantly from Europe and North America. During the workshop, the Russian health professionals were very keen to understand these differences in approaches and how this has an impact on community health on Sakhalin.

Issues identified during the workshop included factors that could improve healthcare delivery and therefore could be considered strategic health development measures. They are included in the matrix as a record of an issue that was raised although they are not health impacts related to the Project and in other HIAs may not have been included in the report.

The tables include impact assessment at both the construction and operational phases. The text contains details about specific health issues, the assessment of the possible impact of the Sakhalin II Phase 2 Project on the community, SEIC staff and contractors and an outline of possible mitigation measures.

9.2 ASSESSMENT PROCESS

Three approaches were used for assessing health risk. The first is based on the method described by Birley in 1995 (Ref. 17) which simply determines the likely change in risk associated with the project. Classification of risk is either increased, unchanged or lower. This assessment is based on reported experience in other locations and in other projects.

Secondly, the SEIC team also used the risk assessment matrix. This matrix is a tool developed by Shell, Sakhalin Energy’s main shareholder, that standardises qualitative risk assessment and facilitates the categorisation of risk into threats to health, safety, environment and reputation. The axes of the matrix are consequences and likelihood. A scale of consequences from zero to five is used to indicate increasing severity based on potential consequences. The horizontal axis of likelihood is estimated based on previous experience in similar projects.

There can be difficulties in applying the matrix for all health issues. Recent experience in other HIA workshops has led to modification of the application of the matrix by utilising it for negative impact only. The matrix does not clearly separate the potential impact from the risk of the actual impact occurring and the team incorporated both concepts to arrive at the risk assessment matrix (RAM) ranking.

During the HIA workshop an exercise to identify priority issues was conducted. However the priorities were not assessed based on the Shell RAM (Ref. 19) or any other structured risk assessment approach, but rather, were based on participants’ experience and expectation of health priorities.

The SEIC team completed the assessment table based on the Shell RAM. Further consultation between the Sakhalin Island health community, general community and the SEIC HIA team is expected to result in some assessment outcome changes. Russian health professionals from the Centre for Sanitary and Epidemiological Supervision considered that the risk assessment should be quantitative using the Russian methodology.

Further details describing the justification and substantiation for the risk level are included in the text.

FIG 8: RISK ASSESSMENT MATRIX

CONSEQUENCE ↓				Increasing Probability →				
				A	B			
HAZARD RATING	People	Assets	Reputa-tion	Never heard of in the world	Heard of incident in our Industry	Incident has occurred in Shell company	Happens several times per year in Shell company	Happens several times per year in our location
1	Slight health effect	Slight damage	Slight impact	LOW RISK				
2	Minor health effect	Minor damage	Limited impact					
3	Major health effect	Localised damage	Considerable impact			MED. RISK		
4	PTD* or 1 to 3 fatalities	Major damage	Major national				HIGH RISK	
5	Multiple fatalities	Extensive damage	Major int’national					

* PTD = Permanent Total Disability

Note: Environment consequence column omitted

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9.3 MITIGATION

The mitigation measures described are a combination of options generated during the HIA workshop and possible options identified by the SEIC team. Following discussion with the community and Sakhalin Island health professionals, these measures will be refined. An extensive range of issues and mitigation measures and the prioritisation of their implementation will require further discussion with the stakeholders to ensure transparency. The proposed approach of both SEIC and key health stakeholders is to focus on project impacts with a high potential for increased morbidity or mortality.

No estimate of residual impact has been made.

Mitigation measures are discussed in more detail in Section 12.

9.4 IDENTIFICATION OF HEALTH ISSUES: SUMMARY TABLES

In the following tables, health issues are classified into five major areas:

- Changed disease spectrum
- Issues related to living conditions
- Changes in demand on infrastructure
- Logistics
- General community health issues

Some issues could be classified under several categories.

The following is a list of definitions for the table headings and classifications:

At-risk groups: these are groups particularly impacted or potentially affected

Biophysical, social and economic factors: this section describes other factors that can contribute to the effect. In general these are social and economic influences.

Health service capability and capacity/infrastructure capability and capacity: this is the current capability and capacity of the health infrastructure to manage the issue. This can be influenced by funding and resources.

Project factors: based on the three previous factors, an estimate is made of the likely impact on the general population of the project for both the construction and the operational phases.

Risk Matrix Ranking: this is an assessment of the level of risk for issues negatively impacted by the project. Ranking can be high, medium or low (Ref. 19).

Mitigation or sustainable development measure: this describes measures to minimise any negative impacts or enhance positive impacts in a sustainable way. For health issues which are not directly impacted by the Project, some possible sustainable development activities are proposed.

TABLE 13: HEALTH IMPACTS ASSOCIATED WITH CHANGES IN DISEASE SPECTRUM - CONSTRUCTION PHASE

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Sexually Transmitted Diseases (STDs)	Women Workforce Family of workforce Youth (male and female) Camp followers and prostitutes IV drug users Economically deprived	High unemployment Increasing cost of living Under-reporting of cases Few recreational facilities in smaller communities	Inconsistent standard of STD treatment Self treatment common or readily available Limited reproductive healthcare Lack of healthcare programme for prostitutes	Large male workforce living in camps working on a regular rotation in a remote area Unaccompanied by family	Medium	STD, HIV/AIDS awareness and health education for all company and contractor staff Quality treatment (contact tracing) for STDs Implement company and contractor standards related to HIV and blood-borne pathogens Community assistance measures: support local approach to STD, HIV/AIDS control Joint review and update of community guidelines Comply with RF screening legislation Camp management policy and camp design with recreation facility Review of medical waste management procedures
HIV AIDS	Women Workforce Family of workforce Youth (male and female) Camp followers and prostitutes IV drug users Economically deprived	High unemployment Increasing cost of living Under-reporting of cases Few recreational facilities in smaller communities	HIV/AIDS – Low case rate at present likely to rise considering STD rate and rapidly increasing incidence of HIV/AIDS in Western Russia Limited treatment funding	Large male workforce living in camps working on a regular rotation in a remote area Unaccompanied by family	Medium/ High	STD, HIV/AIDS awareness and health education for all company and contractor staff Quality treatment (contact tracing) for STDs Implement company and contractor standards related to HIV and blood-borne pathogens Community assistance measures: support local approach to STD, HIV/AIDS control Joint review and update of community guidelines Comply with RF screening legislation Camp management policy and camp design with recreation facility Review of medical waste management procedures

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TABLE 13: HEALTH IMPACTS ASSOCIATED WITH CHANGES IN DISEASE SPECTRUM - CONSTRUCTION PHASE (continued)

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Hepatitis B and C	Medical staff IV drug users Vertical transmission to newborns from carriers	Lifestyle and at-risk behaviour Blood-borne – eg transfusion risk	Under-funded Hepatitis B vaccination programme, incomplete vaccination of high risk groups	Contacts with in-migrated populations from endemic areas	Medium	Hepatitis B immunisation for all SEIC medical personnel and emergency response teams Hepatitis awareness and health education for all company and contractor staff Implement company and contractor standards related to HIV and blood-borne pathogens Community assistance measures – see STD Camp management philosophy and camp design with recreation facility Review of medical waste management procedures
Tuberculosis	Workforce in contact with local population People previously institutionalised Homeless Economically deprived Mentally ill Elderly Prostitutes Those on fixed income/pensioners HIV positive Poorly nourished Alcoholics and other substance abusers	Reservoir of TB in prison population and increasing incidence of drug resistant TB Increasing disparity of income Poor living and sanitary conditions especially in smaller rural communities	Directly Observed Therapy (DOT) not implemented Lack of widely accessible structured screening and treatment	Influx of regional workforce	Medium	Pre-employment and periodic TB screening for workforce in accordance with RF law Assist local authorities in improving TB management programmes
Tularemia	Workforce involved in land clearing Hunters, forest workers and farmers Day trippers	Vectors present in certain areas		Exposure along pipeline route	Low	Contractors clearing the pipeline route should be provided with appropriate clothing Waste management practices within camps should minimise the possibility of rodent infestation

TABLE 13: HEALTH IMPACTS ASSOCIATED WITH CHANGES IN DISEASE SPECTRUM - CONSTRUCTION PHASE (continued)

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Tick-borne encephalitis (TBE)	Workforce involved in land clearing Hunters, forest workers, farmers Day-trippers	Reservoirs and vectors present in some areas Vectors in some areas highly infected	TBE vaccination programme defined by RF law targeting high-risk groups	Exposure along pipeline route in forested and high grass areas	Medium	Contractors clearing the pipeline route should be provided with appropriate clothing Waste management practices within camps should minimise the possibility of rodent infestation Train medical and paramedical staff to recognise cases and to implement the appropriate management regimes Immunisation of at-risk groups in line with RF law
Lyme disease	Workforce involved in land clearing Hunters, forest workers, farmers Day-trippers	Reservoirs and vectors present in some areas Vectors in some areas highly infected	Large increase in diagnosed cases in 2002		Low-Medium	Train medical and paramedical staff to recognise cases and to implement the appropriate management regimes
Leptospirosis	Field workers	Rodents in community			Low	Waste management practices within camps should minimise the possibility of rodent infestation No pets in camps
Q Fever	Abattoir workers				Low (No change)	

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TABLE 14: HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS - CONSTRUCTION PHASE

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Drinking water	Children Elderly Chronically ill Pregnant women	Contaminated water sources Inadequate infrastructure, lack of controls Harsh climatic damage to water system	Limited monitoring Regular reports of factors affecting availability of drinking water	Accidental oil, fuel and chemical discharge (see Volumes 2, 4, 5 and 6 of the EIA)	Medium	Water treatment on SEIC site Monitoring in accordance with plan See Volume 1 of the EIA for a summary of the Oil spill response plan and project alternatives
Food safety and contamination of food	Children Elderly Chronically ill Pregnant women Economically deprived	Variable food and water hygiene levels Lack of running water Lack of refrigeration Lack of awareness about pesticide use and use of human excrement as fertiliser	Local authorities can investigate outbreaks of food poisoning		Medium	Assess and monitor food hygiene procedures and practices in the hotels and catering agencies used by company staff and contractors Develop and implement adequate and standardised food and water hygiene practices for company and contractors Safe supply chain for food (contractual requirement)
Nutrition status and food supply	Economically deprived Prisoners Children Elderly Institutional residents People on fixed income Pensioners Rural dwellers	Lifestyle Limitations of climate on agriculture Socio-economic changes Access to rural communities limited seasonally by logistics and transport Food supplemented by kitchen gardens or dachas Market economy driving importation of food		Increased demand for food (multiplier effect) Supply chain for food	Low/ medium	Construction camps will have catering management including supply chain Food basket monitoring (Chapter 7 of the SIA)
Acute intestinal infections, including hepatitis A and typhoid	Children Elderly Malnourished People in institutions	Contaminated drinking water and inadequate sanitation Local control measures eg boiling water, use of filters	Under-funded infrastructure Frequent monitoring but recommendations not always implemented due to lack of funds		Medium	Treatment of drinking water and good sanitation required for SEIC sites Immunisation of at-risk groups for hepatitis A and typhoid
Cholera	Children Elderly Chronically ill Pregnant women	Potential for contamination of drinking water Inadequate sanitation	Local infectious disease plan and evacuation plan for quarantine	Unchanged unless influx of staff from endemic areas	Low	Cholera
Helminthiasis	Children General population Workforce if no hand-washing water available	Endemic Poor sanitation Poor food hygiene	Well recognised issue		Low- Medium	Good food hygiene Treatment of drinking water Provision of hand-washing water

TABLE 14: HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS - CONSTRUCTION PHASE (continued)

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Fungal diseases		Working and living conditions		Unchanged for population	Low	Good hygiene and good camp management
Pediculosis	Alcoholics Economically deprived Homeless Prostitutes	Lifestyle-related Living conditions			Low	Good hygiene and good camp management
Dental caries	General population	Lifestyle-related Low fluoride content in water	Limited funding but private services increasing	No change		Dental healthcare for SEIC staff
Acute respiratory infections	Smokers Elderly Homeless HIV-positive people Young children	Close working and living conditions Tobacco smoking common Buildings kept well insulated due to cold weather, thus allowing spread of infection	Flu vaccine available but unclear who are target groups	Large number of people with varying immunity to strains of respiratory infections. Large numbers of staff in camps	Medium	Develop risk-based influenza immunisation programme
Substance use/abuse	Unemployed Prostitutes Youth Socially marginalised Workforce	Peer group pressure Increasing divide between rich and poor Cultural pressure to drink alcohol to excess	Limited support services available on Sakhalin Island	Camp living away from family Increased opportunity due to regular income	Medium	Implement own company and site alcohol and drug standard Programme with focus on awareness, prevention and control Implement SEIC Code of Conduct Support health community in improving alcohol and drugs health promotion programmes Employment opportunities within the Project (See Chapter 11 of the SIA) Provide recreational alternatives within camp for workforce
Air emissions Indoor	Smokers Welders			Localised exposure to welding fumes if in poorly ventilated area	Medium Low	Smoking policy Good exhaust extraction if working in confined area
Outdoor	Communities near areas of increased traffic – nuisance dust				See EIA for impact	Details of mitigation are provided for each asset in the EIA

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TABLE 14: HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS - CONSTRUCTION PHASE (continued)

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Changes in psycho-social and economic circumstances	Unemployed Persons on fixed income Pensioners	Change in economic system Change in funding for public housing and services Increase in disparity of incomes Increasing crime/violence Changes in use of drugs and alcohol Rural communities have informal community support networks (See Chapter 5 of the SIA) Pensions at subsistence level, with dependence on kitchen gardens and dachas produce Increase in cost of living (see SIA)	Minimal formal support structures	Project-related boost to elements of local economy	N/A	Positive impact Some improvement in employment and income levels with indirect positive effects on health Negative impact Potential increase in inflation and decrease in purchasing power
Perceptions and expectations	General community Workforce	Community expectation of major changes and concern about potential catastrophic effect on environment, especially fishing Loss of amenity eg beach at Korsakov	Minimal formal support structures Local and national media sources of information	Employment for some of the local population and institutions	Medium	Regular communication and engagement with stakeholder – see stakeholder engagement plan Employment and business opportunity strategy (see Chapter 11 of the SIA) Oil spill response plan

TABLE 15: HEALTH IMPACTS ASSOCIATED WITH INFRASTRUCTURE - CONSTRUCTION PHASE

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Increased Project associated demand on local infrastructure e.g. health, water, sewerage, food supply and power	Workforce Site visitors Victims of RTA In-migration of people associated with indirect services	Remote locations Climate limitations Transport infrastructure Limited access affecting medical evacuation Limited capacity to cope with current demand Increase in RTA Population decline in past ten years but systems have accommodated over 700,000 people	Primary, secondary and the single tertiary hospital Decreasing funding particularly for equipment and supplies Import restrictions Quality, use and availability of medications not evidence based Varying increase in demand for sewerage, water and power	Improved access for medical evacuation due to infrastructure upgrades Unchanged for other medical care Multiplier effect Ratio of staff employed in support services to staff directly involved in project	Medium-High	To enhance positive impact, strategic upgrade and setting up of island-wide medical emergency response plan, in partnership with other companies and stakeholders, is suggested Sewerage within construction camps treated on site HSE clauses in contracts specifying standards and requirements within camps For discussion of the potential depletion and contamination of water supplies, see EIA, in particular Volume 3 (OPF) and Volume 5 (LNG/OET)
Sewage and sanitation	Children Elderly Chronically ill Pregnant women	Failing infrastructure Contaminated water sources Inadequate infrastructure and lack of controls Harsh climatic damage to water system	Under-funded public works resulting in poor maintenance	Indirect increase in demand due to in-migration of people providing support services but not accommodated in camps	High	Implement own waste management plan On-site sewerage treatment for SEIC camps

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TABLE 16: IMPACT ON LOGISTICS - CONSTRUCTION PHASE

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Increase in road traffic accidents	Workforce Children Elderly	Work-related traffic will increase with changing economy Increasing car ownership due to economic development Large numbers of right hand drive vehicles Inexperienced drivers and recent emergence of driving culture so community not accustomed to number of vehicles Large number of non roadworthy vehicles Practice of drink driving (RF law zero BAC)	Extensive hospital network but services limited Poor roads Logistical constraints for emergency healthcare, including poorly structured pre-hospital response capability	Increase in Project road traffic including trucks Improvement in transportation, infrastructure including upgrades to roads and rail network	High	Safety audit Journey management plan Effective HSE management system on road safety (HSE Case <i>Road Transport Management</i>) implemented by company and all contractors through Project life cycle Maintain safety aspect of upgrades and support local efforts – safety awareness, communications on safety, road sign and diversions
Travel health hazards	Regional commuters Local commuters International commuters	Work-related travel Non work-related travel	Limitations on travel Limited number of medical clinics	Increased risk for Project personnel who are in-migrating non Sakhalin residents and expatriated Russian national	Medium	Establish fitness standards and travel health pre-transfer consultations Travel guidelines
Increased demand for waste management	General community Scavengers Population living adjacent to waste sites	Non-compliance issues and inadequate waste management including hazardous waste disposal Possible hazardous materials leaching into water table - see EIA Current practice of burning at landfill sites contributing to air pollution	No hazardous waste facility Landfill practices inadequate	Increased volume of domestic industrial waste and biologically contaminated waste	Medium	Implement the Waste Management Plan for Project life cycle for company and contractors Refer to EIA for details of upgrade programme for landfill Review clinical waste disposal methods

TABLE 17: NON IMPACTS - CONSTRUCTION PHASE

Health Issue	At-risk groups	Biophysical, social and economic factors	Health service capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
LIVING CONDITIONS						
Immunisation	Healthcare workers	Well organised on Sakhalin Island 98% cover for children Cover for adults unclear	Limited funding	Immunisation required as part of SEIC contracts Workforce with variable immunity		Implement immunisation programme for Project population – based on risk/exposure Support of some local immunisation already undertaken
LIFESTYLE						
Smoking	Unemployed Prostitutes Youth Socially marginalized Workforce	Increasing disposable income Increased marketing	Not yet recognised as major health issue Limited support, counselling and treatment	SEIC has a no smoking policy		Smoking policy which limits possibility of passive smoking on SEIC sites Important public health issue
Cardiovascular and cerebro-vascular diseases	Smokers	High smoking rates Under treated hypertension	Under funding			Work jointly with health community in cardio-vascular risk identification and behaviour modification programmes Support nutrition-related health awareness campaigns Company contractors to implement own alcohol, drugs and smoking policies Catering services to provide healthy meal options
Liver disease	Alcoholics Hepatitis B carriers	Cheaply available alcohol	Funding for a single alcohol and drugs unit	No change		

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**Assessment of
health impacts
associated
with the
construction
activity
(2002-2006)**

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Assessment of health impacts associated with the construction activity (2002-2006)

10.1 INTRODUCTION

The following assessment of the Phase 2 Project impact on health uses a biomedical model for categorising the impacts. A quantitative model has not been attempted.

It is recognised that the prevailing socio-economic situation in a community is a key determinant of the health of its members. Employment levels and inequality of income have an effect on health, as do other factors such as the state of housing and access to clean drinking water. At an individual level, access to healthcare and specific behaviours contribute to health, but only in the context of the socio-economic situation.

This section focuses on the issues related to the Project and does not address more general community health issues.

As the actual location of the camps during construction have not yet been determined, it is only possible to generically assess the likely impact on specific communities during the construction period. Details about the possible locations are contained in Chapter 5 of the SIA.

The impacts are classified into five main areas:

- Changes in disease spectrum
- Issues related to living conditions
- Changes in demand on infrastructure
- Logistics
- General community health issues

10.2 CHANGES IN DISEASE SPECTRUM

10.2.1 Sexually Transmitted Diseases

Risk matrix ranking: Medium

STDs are common amongst people of working age on Sakhalin. There is expected to be a significant amount of cross infection between the local population and the imported SEIC and contractor workforce. Any cross infection is likely to spread to the families of both groups.

Evidence from other development projects suggests that prostitution is also likely to rise. Lack of other employment opportunities contributes to this rise. Project-specific factors affecting the incidence of disease include the general management of the camp and the degree of access to local communities.

Although the Project workforce will undergo pre-employment health assessment, this will focus on fitness for work and is not likely to identify persons with STDs. However, non-Russian employees are required to undergo HIV testing for visa purposes and staff in some occupations, e.g. catering, are required to be tested under RF law. It is not SEIC policy to test HIV status prior to employment.

Medical treatment will be available for staff at the camp clinic in order not to increase the load on local healthcare facilities. However non-staff cases of STDs will place some additional burden on community resources.

On the basis of the high background case level and experience in other projects, the risk of significant impact was assessed as medium.

10.2.2 HIV/AIDS

Risk matrix ranking: Medium-high

Compared with the Russian mainland, HIV is at present a minor issue on Sakhalin. However considering the incidence of other STDs, the incidence of HIV is likely to rise. It is the practice on Sakhalin Island to offer testing for HIV status for individuals who are being treated for STDs to assist in the early identification of some new cases.

There are strong indications of under-reporting of HIV positive cases within the RF. AIDS Foundation East

West highlights that the incidence of HIV is rising dramatically in Russia and the newly independent states. WHO assumes that the actual number of HIV-infected individuals in the whole of Russia is five to ten times the officially recorded number.

The Project, especially during the construction phase will introduce or exacerbate several elements that contribute to the incidence of HIV. Notably, the construction workforce is expected to be about 90- 95% male. Potential contractors have also reported that they expect 70-95% of the workforce to be Russian. Of the Russian workforce estimates of employment from Sakhalin Island and the Russian Far East vary from 25-65%. Most workers will not be accompanied by their families.

As noted in the section above, prostitution and casual sexual counters are likely to rise, in part driven by the need for supplemental income for many women in the community. Since prostitution is illegal in Russia, there is no organised preventive healthcare programme for commercial sex workers.

The impact was ranked medium/high on the basis that although the current incidence is low and the spread of HIV may be limited by an active campaign, there is nevertheless a potential for serious consequences. Although there is an argument that the impact should be assessed as high, active mitigation measures will be required irrespective of the assessment classification.

10.2.3 Hepatitis B and C

Risk matrix ranking: Medium

The available figures demonstrate that hepatitis B incidence and carrier rates are high. The risk of transmission by parenteral and sexual routes for the community and the Project workforce will be exacerbated by unprotected sexual contacts and accidental parenteral or shared parenteral exposure.

Although there have been hepatitis B vaccination programmes for some at risk members of the population, such programmes have been incomplete, often due to underfunding. Of concern is the high incidence rate in some medical groups e.g. staff in dialysis units, which suggests transmission in the work place.

Another factor which may affect the incidence of hepatitis during construction is the increase in the use of intravenous drugs and the sharing of needles. There may be an increase in drug use related to changes in income for some parts of the population and an increase in the disparity of income between the employed and unemployed.

10.2.4 Tuberculosis

Risk matrix ranking: Medium

The incidence of TB is static but remains high on Sakhalin Island. It traps the island's poorest, stigmatising individuals and vulnerable groups, including prisoners and the homeless, in a cycle of disease and poor economic means. The underlying contributing factors are:

- Ineffective TB screening programmes (poor scope of screening and diagnostic coverage)
- Reservoir of partially treated and drug resistant TB cases
- High migration of the population
- Inpatient treatment of patients with TB rather than the implementation of the Directly Observed Therapy Shortcourse (DOTS) programme
- Low level public awareness

The workforce will be screened for TB as part of the pre-employment process. The group with an increased risk are the workforce arriving from outside Sakhalin. The Project is not expected to have a direct effect on conditions which influence the incidence of TB. However, any rise in the cost of living may affect the living conditions of those on marginal incomes.

The impact of the Project on TB incidence was assessed as medium on the basis of an a relatively high, drug resistant case rate in combination with exposure of the workforce.

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10.2.5 Tularemia

Risk matrix ranking: Low

Local sanitary agencies have serological evidence that there have been cases of tularemia, although few clinical diagnoses have been made. It is assumed that treatment for other common conditions provides an incidental cure for tularemia.

Although the workforce will be exposed to vectors, the current incidence of tularemia and its apparent benign nature and treatment means the risk will be low, particularly if direct contact with rodents is avoided. For individuals involved in clearing of the pipeline route, there is a possibility of tick contact which increases the risks for this group. However during the HIA workshop, local sanitary agency practitioners considered that the risk of these infections was high and warranted extensive further investigation. Russian legislation requires that at risk groups are vaccinated against tularemia.

10.2.6 Tick Borne Encephalitis (TBE)

Risk matrix ranking: Medium

The report from the local sanitary authority suggests that there will be an increase in a range of vectors including ticks and gadflies during pipeline construction, due to the growth of grass and small bushes following forest clearing. As the pipeline is buried and the land restored post construction, the vector population is not likely to be affected in the long term. Therefore there is no real change to the level of risk for the general population. Among the workforce, those performing manual land clearance through forests for the pipeline right of way and the land survey crews will have an increased exposure to ticks. An increase in tick bites may increase the risk of tick-borne disease. Longer term, the highest risk is for people who are hunting or pursuing other activities in the forest areas. Russian law requires vaccination for at risk groups.

10.2.7 Lyme Disease

Risk matrix ranking: Low -medium

The dramatic increase in diagnosis of Lyme disease appears to be related to improved diagnosis in the past two years. Although there is not likely to be a change in the true incidence for the general population, the workforce exposed to ticks will be at risk.

10.2.8 Leptospirosis

Risk matrix ranking: Low

Avoidance of exposure, effective waste management to minimise rodent infestation and prohibition of domestic pets in construction camps will reduce the risk to the workforce. Project activities are not likely to increase the risk for the general population.

10.2.9 Q Fever

Risk matrix ranking: Low

Project activity is not expected to alter the incidence of this disease, which is usually found in abattoir workers and farmers.

10.3 IMPACTS ASSOCIATED WITH LIVING CONDITIONS

10.3.1 Food-borne and Water-borne Diseases

Risk matrix ranking: Medium

The Project activities are not expected to have a major direct effect on the incidence of food-borne disease. Transmission of diseases including hepatitis A and salmonella (including typhoid) relate to general food hygiene including preparation and storage. Unreliable power clearly affects refrigeration

and food storage, especially for food that has been frozen, thawed and refrozen. The construction camps will have backup power sources if they are connected to the local power grid.

The Project employees will be accommodated in camps where strict food hygiene measures are required. Additionally a supply chain that requires demonstrable satisfactory food handling reduces the likelihood of food-borne disease. The Project workforce may be at increased risk if they purchase contaminated food at local markets which has not been prepared or washed properly.

Contaminated drinking water in some communities (see Fig 7) also contributes to gastrointestinal disease. As with rural communities elsewhere in the world, rural industry and rural populations are shrinking. Local utilities therefore have difficulty funding maintenance in such areas. This was suggested during both Study C and D, although this has not been confirmed with local water authorities.

Water in SEIC camps will be treated, which will minimise the risk of water-borne disease to the workforce. The pipeline route and construction camp locations have been selected to minimise the impact on the physical environment, particularly the impact on water sources used for drinking. This is discussed in Project alternatives in Volume 1, Chapter 5 of the EIA.

10.3.2 Nutrition and Food Supply

Risk matrix ranking: Low - medium

Each construction camp will have a catering contractor responsible for the food supply chain. As noted in the previous chapter, much of the food on Sakhalin is imported.

Food basket monitoring will be undertaken to record any increases in the costs of food (this may take place in response to increases in demand). The groups who may suffer most from this are those on fixed or low incomes. Evidence to date suggests that the influx of expatriates during the past three years has influenced the availability of a diverse range of imported food and goods. This is market driven by those with the income to spend on such items.

No recent baseline data regarding the nutritional status of the population was available. However, economic data suggests that one third of the population exists on a subsistence income, supporting a hypothesis that nutrition in such groups is likely to be less than adequate.

For the SEIC workforce and construction camp residents, a wide range of food is available in the company canteens. All food groups are available in each meal.

There is likely to be an increase in supporting industries and, although some local people will be employed, many of the people living in communities adjacent to camps are not of working age.

10.3.2.1 Food Contamination

Risk matrix ranking: Medium

As importation of foodstuffs increases with public demand and financial capability, better selection and consistent high quality of food is anticipated. Reliable storage facilities will also reduce the likelihood of spoilage and deterioration. Supply chain management and strict food hygiene management will reduce the risk of contamination inside the construction camps. Well-maintained accommodation is also expected to facilitate high levels of hygiene. Catering and accommodation staff will need to meet the RF standards for pre-employment and will require periodic medical examination including vaccination for hepatitis A and typhoid.

10.3.3 Drugs and Alcohol

Risk matrix ranking: Medium

Alcohol abuse is already a widespread problem on Sakhalin. Vodka is cheap and readily available. The Project may alter socio-economic circumstances and therefore may lead to an increased use of better quality alcohol rather than a change in level of drinking. Alcohol abuse may be a risk in the project work environment, especially affecting workplace safety.

Drug use associated with an increase in activities including prostitution is clearly a potential adverse impact of the Project. Increased intravenous drug use will also increase the risk of HIV. The impact was

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assessed as medium/high on the basis of a low existing background level which could become a severe impact should the HIV rate rise significantly. However a focused programme will be required to minimise the potential adverse impact. Discussion has already commenced with AIDS East West, and the HIV centre in Yuzhno District.

10.3.4 Housing and Living Conditions

Risk matrix ranking: Low

The workforce will be housed in camps that meet SEIC requirements for accommodation. There will be some additional demand for housing in Yuzhno District but it is not anticipated that there will be many employees in non-company accommodation outside Yuzhno. However, the cost of housing is already rising in Yuzhno-Sakhalinsk and Korsakov Districts. This will affect those on fixed incomes and retired persons, especially those in rental accommodation.

There is a growth in housing construction in Yuzhno-Sakhalinsk which is benefiting the housing sector and associated trades. However the cost of housing is rapidly rising. This is part of the social monitoring programme and is discussed in the SIA.

The Project is expected to only lead to increased demand on infrastructure, such as heating and electricity, in Yuzhno, due to the requirements of an increased population. Outside Yuzhno, the camps will generally be self sufficient and therefore are not likely to impact on existing infrastructure.

Rural communities are unlikely to have any direct benefit in terms of housing or infrastructure, but the gas pipeline has off-takes for gas should local authorities decide to provide mains gas to parts of Sakhalin Island.

Poor housing conditions have an adverse affect on health, especially on the incidence of diseases associated with crowded living conditions, e.g. Tuberculosis and scabies.

10.3.4.1 Sewage Treatment

Most camps are located at some distance from local treatment facilities and will have independent sewerage treatment. An exception is Poronaisk camp which is located in the town limits and is connected to the local sewerage network.

The Project design has taken into account the town and village water sources and avoided construction at critical water catchment areas. A detailed description of the pipeline route and routing alternatives is included in Volume 1, Chapter 5 of the EIA.

10.3.5 Air Emissions

Risk matrix ranking: Low - medium

Extensive modelling and estimation of air emissions has been included as part of the baseline data for each asset assessed within the EIA. This modelling considered construction and operational activity and demonstrated that the levels will be about 15% of WHO health limits during the operational phases and therefore are not expected to impact on health.

10.3.6 Employment

The infrastructure upgrade will use local Sakhalin Island contractors for the upgrade of roads, ports and bridges. The total workforce will be about 2,000 people. The contractors estimates for employment of local people vary from 25 to 65%. The SEIC position on employment, training and business development is detailed in Chapter 11 of the SIA.

Health and well being is often better amongst the employed than the unemployed. Any increase in employees is likely to have a positive effect on the population.

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10.3.7 Hazardous Substances

SEIC minimum health standards require product stewardship of hazardous substances. This includes the cradle to grave management of these materials, starting with the selection of the substances based on minimum effect on human and environmental health. All products must also be registered for use in Russia. Some carcinogenic materials, such as asbestos, have been excluded from use (apart from limited use in gaskets) in the Project Basis of Design.

This issue is included in the occupational health risk assessment for each location.

10.3.8 Noise

Noise standards have been included in the design requirements for each of the facilities. The design will minimise the noise exposure for employees within the fence line. Environmental noise at the fence line is being modelled and will be included for the relevant assets in the EIA report.

As the design has minimal noise production no adverse health impact is anticipated.

10.4 CHANGE IN DEMAND FOR INFRASTRUCTURE

10.4.1 Health Infrastructure

Risk matrix ranking: Medium - high

From a Project perspective, the demand on health services will depend on the number of people in each location and the nature of work undertaken. The location of the construction camps and the number of occupants will be determined as part of the construction contract.

The workforce population will be spread throughout Sakhalin Island, although large concentrations will be located at the LNG plant construction site in Prigorodnoye, the OPF construction site south of Nogliki and the construction camps along the pipeline right of way. The working population will vary between the construction and operational phases. During construction there will be seasonal variation in the working population (see Table 4). There is a more detailed description of the workforce numbers and locations in Section 8.

Based on the experiences of comparable oil and gas projects and projections in the Project HSE plan, SEIC can expect about three cases of work-related injury requiring medical treatment per million man hours and between two and three cases per million man hours requiring medical evacuation to a secondary medical care facility. Medical evacuation is often required for non-work related medical conditions such as cardiovascular or gastrointestinal disease.

At the peak of construction, the workforce will be approximately 13,000. The total working hours will be about 30-40 million per annum at this time. Therefore the estimated demand on specialised (secondary facilities) will be about 150-200 patients per year at the peak of construction in 2004 -2005.

One third of the workforce will be located in construction camps at Prigorodnoye near Korsakov. Approximately 1,000 will be at the OPF construction site near Nogliki and a further 5,000 will be in camps along the five pipeline spreads.

Each of the camps will have a general practice and emergency healthcare facility but will require support from the local hospital system for qualified and specialised (secondary and tertiary) healthcare. Initial stabilisation will occur at the camp clinic. There will be some designated helicopter landing sites along the pipeline right of way, at the OPF site and the LNG plant construction site. Fixed-wing landing is possible at Nogliki and Yuzhno-Sakhalinsk.

The following alternatives are based on assumptions about healthcare funding for SEIC staff, contractors and subcontractors. Although there is mandatory health insurance supported by the employer, this only covers basic medical services.

There will be debate over which location will have additional services. Because of upper limits to funding however, the options may include supporting development of triage and emergency care at several locations with additional facilities further supported at only a few locations. This will ensure a patient can

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be resuscitated adequately prior to medical evacuation. SEIC will not be able to financially justify extensive development of hospital facilities throughout Sakhalin and will need to work with regional and local health authorities to determine the best options to meet the company's needs whilst recognising the expectations of the local communities.

In addition, resources may be required along the pipeline route. Based on information currently available about facilities along the route, such sites would be used only as a very temporary staging location until an evacuation team could retrieve the patient. Although Prigorodnoye is about 20 minutes by road to Korsakov, the current access and triage situation in Korsakov may mean immediate transfer to the regional hospital in Yuzhno-Sakhalinsk is a better option for serious cases from the LNG site.

The expectation is that three or four hospital facilities will be required to support the Project. It is anticipated that a system of clinical algorithms would determine which patients would be relocated to the Regional hospital and which patients could be satisfactorily cared for in other locations. For example, as the Regional hospital has the only CT scanner, all head injuries would be transferred there.

10.4.1.1 Immunisation

Risk matrix ranking: Low

An influx of workers from regions with different immunisation profiles can have impacts on the local community, particularly if immunisation compliance in the past was inadequate. The SEIC approach is to immunise at-risk groups for specific diseases, although there will be mandatory immunisation for all against diphtheria, tetanus and polio. The requirements of the RF immunisation programme will be adopted.

10.5 IMPACTS ON LOGISTICS

10.5.1 Road Traffic Accidents

Risk matrix ranking: High

A number of factors that contribute to road traffic accidents are already present on Sakhalin Island. These include:

- A poorly maintained road network exacerbated by weather conditions such as dust in the summer and ice and snow in winter
- There are also many right hand drive vehicles in a country that drives on the right hand side of the road
- Unroadworthy and poorly maintained vehicles
- Poorly lit roads
- Limited public transport outside urban environments
- High level of alcohol abuse with consequent drink driving, although illegal
- Rapid growth of car ownership in the past two years with many inexperienced drivers and pedestrians who are not used to the level of traffic

The road accident statistics demonstrate an increase in fatal accidents and injuries in the past 12 months. The construction activity will increase the number of vehicle movements, especially large vehicles, moving through small towns and villages. In oil and gas construction projects elsewhere, road traffic accidents have been the major cause of project-related fatalities.

SEIC will have a structured approach to traffic management and vehicle standards which will be encompassed in the Road Transport HSE Case, an integral part of the HSE MS.

10.5.2 Waste

Risk matrix ranking: Medium

During Project construction and operation, a range of both industrial and domestic waste will be

generated. This issue is addressed extensively in the EIA. A structured solid waste management plan has been prepared as part of the environmental mitigation measures. Consideration of medical contaminated waste, hazardous substance handling, radioactive waste and rodent management has been included in the plan.

In recognition of the existing waste management situation on Sakhalin, SEIC has pursued a co-operative approach with the local administration, and has undertaken a reconnaissance survey of the existing (legal and illegal) landfills along the Project alignment, recognizing over 50 of such locations. On nine selected facilities a more substantial survey has been performed. Based on the results of the surveys as well as a mutual agreement with the Sakhalin Oblast Administration, SEIC intends to provide funding for a selective, Upgrade Programme to be implemented on those sites that will be used for SEIC's non-hazardous waste during the construction stage.

The absence of a hazardous waste facility on the island has led to the approach that SEIC, again in co-operation with the Sakhalin Oblast Administration, has performed the initial survey for siting such facility specifically for SEIC's hazardous wastes. Information and where possible, support is provided to the Oblast Administration to allow initiation of a similar facility for general use.

The waste management plan, including the description of the upgrade of landfill facilities during construction, is also contained in the EIA.

10.6 COMMUNITY HEALTH ISSUES

10.6.1 Cardiovascular and cerebrovascular diseases

Risk matrix ranking: Positive impact for workforce

The incidence of disease in the working population is generally lower than in the total population. By virtue of SEIC's non-smoking policy in the working environment, one of the major risk factors for vascular disease will be reduced.

As the construction camps will have clinics for primary healthcare and there will be periodic health assessments, there is a likelihood that cardiovascular health conditions will be diagnosed early and treated appropriately.

Regular employment and income may have an indirect positive impact for families of the workforce, enabling them to buy nutritious food. Clearly this is dependent on how individuals decide to spend such extra income.

The contribution of poor nutrition, obesity and elevated cholesterol levels to vascular disease is difficult to evaluate as these factors are likely to vary greatly between urban dwellers in the south and inhabitants of the rural and smaller villages in the north of Sakhalin.

Food availability is seasonal and some food groups are expensive and hence lacking in the diets of some members of the population. Poor diet, particularly a diet low in fruit and vegetables, has been shown to have a similar effect to elevated cholesterol levels in terms of Disability Adjusted Life Years (Ref. 20).

10.6.2 Smoking

Risk matrix ranking: No impact for general population but positive effect for workforce

If there is no change in the present smoking habits of Russians, more than two million people will die annually from tobacco-related disease by 2020. Since the majority of smokers will die prematurely and may become invalids during the last years of their life, the impact on the community and the company is likely to increase. Within the company, however, the smoking rate is likely to be reduced due to the company's non-smoking policy.

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Commissioning of the plant is expected to start in 2006/7. At this time the workforce will have begun to reduce. The reduction in numbers is expected to reduce health effects related to the large number of people working on the Project. This workforce reduction may lead to a 'boom-bust' cycle which is discussed in the cumulative impacts section of the SIA. However it will take several years after commissioning to reach a steady state workforce.

The production sharing agreement includes a requirement for 70% Russian employee content over the lifetime of the Project. SEIC has a strategy for increasing the Russian workforce in the early years of operation. With a change to a local, stable workforce some negative factors related to a largely male transient workforce are likely to be eased.

The change in the socio-economic situation is difficult to predict, although there is likely to be an increase in the disparity of income between those on fixed or marginal incomes and those employed either directly or indirectly. Services such as provision of safe drinking water and other infrastructure may improve depending on budget allocation. Improved waste management is expected to reduce possible contamination of water sources.

The possibility of gas supply for the Island is discussed in Chapter 10 of the SIA.

The layout design of the facilities has taken into account workplace exposures to physical hazards such as noise and ergonomic hazards. The selection of chemicals and processes under the chemical management plan takes into account potential impacts on health. Detailed emergency response plans and site-specific medical emergency response plans are available in the case of an unplanned event.

The company HSE management system requires HRAs for all critical activities, with a review should an activity change. In contrast with RF risk assessments, the SEIC HRAs are not quantitative but are qualitative, using the risk assessment matrix described previously.

The following tables (Tables 18 - 22) are a summary of the health and other issues pertinent to the operational phase of the Project. Some elements which may have a high impact during the construction phase are not expected to have significant impact during the operational phase due to:

- Mitigation measures in construction
- Changing demography and a stable workforce
- Increased public sector spending by Regional Authorities

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TABLE 18: HEALTH IMPACTS ASSOCIATED WITH CHANGES IN DISEASE SPECTRUM - OPERATIONAL PHASE

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Sexually Transmitted Diseases (STDs)	Women Workforce Family of workforce Youth (male and female) Camp followers and prostitutes IV drug users Economically deprived	High unemployment Increasing cost of living Under-reporting of cases Few recreational facilities in smaller communities	Inconsistent standard of STD treatment Self treatment common or readily available Limited reproductive healthcare Lack of healthcare programme for prostitutes	Large male workforce living in camps working on a regular rotation in a remote area Unaccompanied by family	Medium	STD, HIV/AIDS awareness and health education for all company and contractor staff Quality treatment [contact tracing] for STDs Implement company and contractor standards related to HIV and blood-borne pathogens Community assistance measures: support local approach to STD, HIV/AIDS control Joint review and update of community guidelines Comply with RF screening legislation Camp management policy and camp design with recreation facility Review of medical waste management procedures
HIV AIDS	Women Workforce Family of workforce Youth (male and female) Camp followers and prostitutes IV drug users Economically deprived		HIV/AIDS – Low case rate at present likely to rise considering STD rate and increasing incidence in Western Russia	Stable workforce	Medium/High	STD, HIV/AIDS awareness and health education for all company and contractor staff Quality treatment [contact tracing] for STDs Implement company and contractor standards related to HIV and blood-borne pathogens Community assistance measures: support local approach to STD, HIV/AIDS control Joint review and update of community guidelines Comply with RF screening legislation

TABLE 18: HEALTH IMPACTS ASSOCIATED WITH CHANGES IN DISEASE SPECTRUM - OPERATIONAL PHASE (continued)

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Hepatitis B and C	Medical staff IV drug users Vertical transmission to newborns from carriers	Lifestyle and at-risk behaviour Blood-borne – eg transfusion risk	Under-funded Hepatitis B vaccination programme, incomplete vaccination of high risk groups		Medium	Hepatitis B immunisation for all SEIC medical personnel and emergency response teams Hepatitis awareness and health education for all company and contractor staff Implement company and contractor standards related to HIV and blood-borne pathogens Community assistance measures – see STD Camp management philosophy and camp design with recreation facility Review of medical waste management procedures
Tuberculosis	Workforce in contact with local population People previously institutionalised Homeless Economically deprived Mentally ill Elderly Prostitutes Those on fixed income/pensioners HIV positive Poorly nourished Alcoholics and other substance abusers Homeless	Reservoir of TB in prison population and increasing incidence of drug resistant TB Increasing disparity of income Poor living and sanitary conditions especially in smaller rural communities	Directly Observed Therapy (DOT) not implemented Lack of widely accessible structured screening and treatment	Stable workforce	Low	Good quality case identification and treatment in accordance with DOTS Pre-employment and periodic TB screening for workforce in accordance with RF law Assist local authorities in improving TB management programmes
Tick-borne encephalitis (TBE) and Lyme disease	Maintenance crews Hunters, forest workers, farmers Day-trippers	Reservoirs and vectors present in some areas Vectors in some areas highly infected	BE vaccination programme defined by RF law targeting high-risk groups	Exposure along pipeline route in forested and high grass areas Maintenance crew 50-100 people	Low	Waste management practices within camps should minimise the possibility of rodent infestation Immunisation of at-risk groups in line with RF law e.g. maintenance crew
Tularemia	Workforce involved in land clearing Hunters, forest workers and farmers Day trippers	Vectors present in certain areas		Exposure along pipeline route for maintenance crew	Low	See above

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TABLE 19: HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS - OPERATIONAL PHASE

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Drinking water Potential catastrophic event and effect on drinking water e.g. oil spill, pipeline leak	Children Elderly Chronically ill Pregnant women	Contaminated water sources Inadequate infrastructure, lack of controls Harsh climatic damage to water system	Limited monitoring Regular reports of factors affecting availability of drinking water	Facilities will have own wells and water treatment	Low	Water treatment on SEIC site Monitoring in accordance with Plan Oil spill response plan (see Volume 1 of the EIA)
Food safety and contamination of food	Children Elderly Chronically ill Pregnant women Economically deprived	Variable food and water hygiene levels Lack of running water Lack of refrigeration Lack of awareness about pesticide use and use of human excrement as fertiliser	Local authorities can investigate outbreaks of food poisoning		Low	Assess and monitor food hygiene procedures and practices in the hotels and catering agencies used by company staff and contractors Develop and implement adequate and standardised food and water hygiene practices for company and contractors Safe supply chain for food (contractual requirement)
Nutrition status and food supply	Economically deprived Prisoners Children Elderly Institutional residents Those on fixed income Pensioners	Lifestyle Limitations of climate on agriculture Socio-economic changes Access to rural communities limited seasonally by logistics and transport Food supplemented by kitchen gardens or dachas Market economy driving importation of food		Supply chain for food	Low	Camps will have catering management including supply chain Refer to SIA
Acute intestinal infections, including hepatitis A and typhoid	Children Elderly Malnourished People in institutions	Contaminated drinking water and inadequate sanitation Local control measures eg boiling water, use of filters	Under-funded infrastructure Frequent monitoring but recommendations not always implemented due to lack of funds		Low	Treatment of drinking water and good sanitation required for SEIC sites Immunisation of at-risk groups for hepatitis A and typhoid
Helminthiasis	Children General population Workforce if no hand-washing water available	Endemic Poor sanitation Poor food hygiene	Well recognised issue		Low	Good food hygiene Treatment of drinking water Provision of hand-washing water
Fungal diseases	Working and living conditions	Unchanged for population			Low	Good hygiene and good camp management

TABLE 19: HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS - OPERATIONAL PHASE (continued)

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Pediculosis	Alcoholics Economically deprived Homeless Prostitutes	Lifestyle-related Living conditions			Low	Good hygiene and good camp management
Dental caries	General population	Lifestyle-related Low fluoride content in water	Limited funding but private services increasing	No change		Dental healthcare for SEIC staff
Acute respiratory infections	Smokers Elderly Homeless HIV-positive people Young children	Close working and living conditions Tobacco smoking common Buildings kept well insulated due to cold weather, thus allowing spread of infection	Flu vaccine available but unclear who are target groups	Large number of people with varying immunity to strains of respiratory infections. Large numbers of staff in camps	Low	Develop risk-based influenza immunisation programme
Substance use/abuse	Unemployed Prostitutes Youth Socially marginalized Workforce	Peer group pressure Increasing divide between rich and poor Cultural pressure to drink alcohol to excess	Limited support services available on Sakhalin Island	Camp living Away from family Increased opportunity	Medium	Implement own company and site alcohol and drug standard Programme with focus on awareness, prevention and control Implement SEIC Code of Conduct Support health community in improving alcohol and drugs health promotion programmes Employment opportunities within the Project (See SIA) Provide recreational alternatives within camp for workforce
Air emissions Indoor	Smokers Welders			Localised exposure to welding fumes if in poorly ventilated area	Medium Low	Smoking policy Good exhaust extraction if working in confined area
Outdoor	Communities near areas of increased traffic – nuisance dust				See EIA	Details of mitigation are provided for each asset in the EIA

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TABLE 19: HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS - OPERATIONAL PHASE (continued)

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Changes in psycho-social and economic circumstances	Unemployed Persons on fixed income Pensioners	Change in economic system Change in funding for public housing and services Increase in disparity of incomes Increasing crime/violence Changes in use of drugs and alcohol Rural communities have informal community support networks (See SIA) Pensions at subsistence level, with dependence on kitchen garden and dacha produce Increase in cost of living (see SIA)	Minimal formal support structures	Project-related boost to elements of local economy	See mitigation	<p>Positive impact</p> <p>Some improvement in employment and income levels with indirect positive effects on health</p> <p>Negative impact</p> <p>Potential increase in inflation and decrease in purchasing power</p> <p>Refer to SIA</p> <p>Sustainable development plans for strategic economic empowerment</p>
Perceptions and expectations	General community Workforce	Community expectation of major changes and concern about potential catastrophic effect on environment, especially fishing Loss of amenity eg beach at Korsakov	Minimal formal support structures Local and national media sources of information	Employment for some of the local population and institutions	Medium	<p>Regular communication and engagement with stakeholder – see stakeholder engagement plan</p> <p>Employment and business opportunity strategy (see SIA)</p> <p>Oil spill response plan</p>

TABLE 20: HEALTH IMPACTS ASSOCIATED WITH INFRASTRUCTURE - OPERATIONAL PHASE

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Increased Project demand on local infrastructure e.g. health, water, sewerage, food supply and power	Workforce	Remote locations	Primary, secondary and the single tertiary hospital	Improved access for medical evacuation due to infrastructure upgrades	Low	To enhance positive impact, strategic upgrade and setting up of island-wide medical emergency response plan, in partnership with other companies and stakeholders, is suggested
	Site visitors	Climate limitations	Decreasing funding particularly for equipment and supplies	Unchanged for other medical care		Sewerage within camps treated on site
	Victims of RTA	Transport infrastructure	Import restrictions	Onsite sewerage treatment		HSE clauses in contracts specifying standards and requirements within camps
	In-migration of people associated with indirect services	Limited access affecting medical evacuation	Quality, use and availability of medications not evidence based			For discussion of the potential depletion and contamination of water supplies, see EIA, in particular Volume 3 (OPF) and Volume 5 (LNG/OET)
		Limited capacity to cope with current demand	Increase community demand for sewerage, water and power			
		Increase in RTA				

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TABLE 21: IMPACT ON LOGISTICS - OPERATIONAL PHASE

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Increase in road traffic accidents	Workforce Children Elderly	Work-related traffic will increase with changing economy Increasing car ownership due to economic development Large numbers of right hand drive vehicles Inexperienced drivers and recent emergence of driving culture so community not accustomed to number of vehicles Large number of non roadworthy vehicles Practice of drink driving (RF zero tolerance)	Extensive hospital network but services limited Poor roads Logistical constraints for emergency healthcare, including poorly structured pre-hospital response capability	Increase in Project road traffic including trucks Improvement in transportation, infrastructure including upgrades of airport and rail network	Low	Effective HSE management system on road safety (HSE Case road transport management) will be implemented by company and all contractors through Project life cycle
Travel health hazards	Regional commuters Local commuters International commuters	Work-related travel Non work-related travel	Limitations on travel Limited number of medical clinics	Increased risk for Project personnel who are in-migrating non Sakhalin residents and expatriate Russian nationals	Low	Establish fitness standards and travel health pre-transfer consultations Travel guidelines
Increased demand for waste management	General community Scavengers Population living adjacent to waste sites	Non-compliance issues and inadequate waste management including hazardous waste disposal Possible hazardous materials leaching into water table - see EIA Current practice of burning at landfill sites contributing to air pollution	No hazardous waste facility Landfill practices inadequate	Increased volume of domestic industrial waste and biologically contaminated waste	Medium	Implement the Waste Management Plan for Project life cycle for company and contractors Refer to EIA for details of upgrade programme for landfill Review clinical waste disposal methods

TABLE 22: NON IMPACTS- OPERATIONAL PHASE

Health Issue	Contributing populations	Biophysical, social and economic factors	Infrastructure capability and capacity	Project factors	Risk Matrix Ranking	Mitigation
Living Conditions Sewage and sanitation	Children Elderly Chronically ill Pregnant women	Failing infrastructure Contaminated water sources Inadequate infrastructure and lack of controls Harsh climatic damage to water system	Under-funded public works resulting in poor maintenance	Indirect increase in demand due to in-migration of people providing support services but not accommodated in camps	Low	Implement own WMP On-site sewerage treatment for SEIC camps
Immunisation	Healthcare workers	Well organised on Sakhalin Island 98% cover for children Cover for adults unclear	Limited funding	Immunisation required as part of SEIC contracts Workforce with variable immunity		Implement immunisation programme for Project population – based on risk/exposure Support of some local immunisation already undertaken
Lifestyle Smoking	Unemployed Prostitutes Youth Socially marginalized Workforce	Increasing disposable income Increased marketing	Not yet recognised as major health issue Limited support, counselling and treatment	SEIC has a smoking policy		Smoking policy which limits possibility of passive smoking on SEIC sites
Cardiovascular and cerebrovascular diseases	Smokers	High smoking rates Under treated hypertension	Under funding			Work jointly with health community in cardiovascular risk identification and behaviour modification programmes Support nutrition-related health awareness campaigns Company contractors to implement own alcohol and drugs and smoking policies Catering services to provide healthy meal options
Liver disease	Alcoholics Hepatitis B carriers	Cheaply available alcohol	Funding for a single alcohol and drugs unit	No change		

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Chapter

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**Assessment of
health impacts
associated with
the operation
activity
(post 2007)**

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Assessment of health impacts associated with the operation activity (post 2007)

12.1 CHANGES IN DISEASE SPECTRUM

12.1.1 Sexually Transmitted Diseases

Risk matrix ranking: Low

The work force numbers in all assets will decrease significantly post construction. The remaining workforce will not be as transient as it was during construction, and it is expected that a number of the workforce will be living permanently on the Island with their families. These factors are likely to reduce the likelihood of the occurrence of STDs during operation.

12.1.2 HIV/AIDS

Risk matrix ranking: Medium - High

As noted, the workforce numbers and the stability of the workforce will change during the operational phase. However, due to the, current, incurable nature of HIV, and on a background of anticipated rise in HIV incidence on Sakhalin, the potential risk remains medium/high. Project factors which impact on this include the possible rise in intravenous drug use amongst the population. This may be driven by changes in economic circumstances and income. Those with a regular income may have a higher discretionary income for the purchase of drugs, and equally those who are not employed may turn to drug use as a means of coping with circumstances.

Overall HIV/AIDS remains a serious public health issue during the operational phase.

12.1.3 Hepatitis B and C

Risk matrix ranking: Low

Although hepatitis B and C have some parallels with HIV transmission, the assessment of impact of these conditions is lower. Similar Project influences, as described for STDs and HIV, contribute to the incidence and spread of these conditions, however, vaccination is available for hepatitis B. Improved awareness and management of situations may influence transmission of the disease in health environments may reduce the incidence of both conditions in clinical circumstances. Community programmes during the construction phase are expected to improve awareness about the spread of blood borne disease in the general community, this should help to reduce impacts during the operational phase.

12.1.4 Tuberculosis

Risk matrix ranking: Low

Changes in living conditions among the workforce and Island population may vary during the operational phase. For those with a regular income from either the Project or other supporting industries, living circumstances are expected to improve, thereby reducing the likelihood of infection. Screening and treatment for diseases such as TB is more likely to be pursued by employed people which should also reduce the likelihood of the occurrence of untreated tuberculosis. The pool of under-treated drug resistant cases may be influenced by changes in the organisation of tuberculosis services, but this is outside the direct influence of SEIC.

12.1.5 Tick Borne Encephalitis and Lyme Disease

Risk matrix ranking: Low

During the operational phase there will be a small pool of pipeline maintenance workers (50-100) who potentially may be exposed to a tick-inhabited environment.

This is a small 'at risk' group in comparison with the general community who pursues leisure activities in similar environments where tick vectors are known to occur. Therefore the impact of the operational phase on the occurrence of TBE and Lyme Disease is expected to be low.

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12.1.6 Tularemia

Risk matrix ranking: Low

Operational circumstances are not expected to have any influence on the case rate of tularemia.

12.2 HEALTH IMPACTS ASSOCIATED WITH LIVING CONDITIONS

12.2. Drinking water

Risk matrix ranking: Low

Risk matrix ranking: Medium (in the case of catastrophic event)

Routine activity is not anticipated to influence drinking water availability and quality. As described in the EIA, the pipeline crosses the sanitary protection zone in several areas. In recognition of the potential but unlikely event of an oil spill there is an extensive monitoring programme in place. This is in addition to the measures that have been undertaken during pipeline design and the performance integrity processes (eg intelligent pigging) to minimise the risk of a spill contaminating water sources.

12.2.2 Food safety and contamination

Risk matrix ranking: Low

Food hygiene practices are expected to be good within SEIC locations, and to improve in the general community. Operational activity is not likely to influence food contamination.

12.2.3 Nutrition and Food supply

Risk matrix ranking: Low

An increasingly market driven economy is anticipated on Sakhalin as part of economic development in the region. The operational phase, with an anticipated maximum workforce of 1800, is not likely to affect food availability. Nutrition is also influenced by food affordability which is not likely to change in the general population due to the operational activity.

12.2.4 Acute intestinal infections

Risk matrix ranking: Low

If general living conditions, drinking water and food hygiene improve there is less likelihood of outbreaks of acute intestinal infection such as hepatitis A and typhoid.

Operational activities are not expected to affect the likelihood of outbreaks of such diseases.

12.2.5 Helminthiasis

Risk matrix ranking: Low

Although worm infection is wide spread in the general Sakhalin Island population, and often associated with poor living conditions, the operational activities are not expected to affect the incidence of infection. Although the workforce will have the same exposures as the general population in Yuzhno-Sakhalinsk and Korsakov, due to a regular income, their living circumstances are anticipated to be of a reasonable standard which reduces the chances of infection.

12.2.6 Fungal Diseases/Pediculosis/Acute respiratory infections

Risk matrix ranking: Low

These conditions tend to be higher when housing conditions are poor. As noted previously, the operational phase may improve socio economic circumstances (and therefore housing conditions) for some of the population. Overall there is unlikely to be a direct impact on the incidence of these diseases.

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12.2.7 Dental Caries

Risk matrix ranking: No change

Dental care is improving on Sakhalin and therefore illness through poor dental hygiene is expected to reduce. Nutrition, which may affect dentition, has been discussed in a previous section.

12.2.8 Substance Use/Abuse

Risk matrix ranking: Medium

Many factors influence changes in drug and alcohol use, both improvement and deterioration in circumstances can lead to an increase in use: the former due to an increase in disposable income; and the latter as a means of dealing with one's environment. However, the changes can also lead to a decrease in use due to a decrease in affordability. The impact therefore could be positive or negative, depending on the circumstances of the 'at risk' people.

12.2.9 Air emissions

Risk matrix ranking: Low

Air emissions modelling for the operational phase is discussed in the EIA. The anticipated emissions for the LNG site are not likely to exceed 15% WHO limits and are not expected to have any health impact.

12.2.10 Changes in psycho-social and economic circumstances

Risk matrix ranking: Low - medium

The socio-economic situation on Sakhalin is expected to be influenced by the Sakhalin II, Phase 2 Project, predominately in a positive direction. Any inflation may adversely affect those on low incomes, but the increases in income to the local government lead to improvements in social support.

12.2.11 Perceptions and Expectations

Risk matrix ranking: Medium

Some members of the community have high expectations of the Project and its impact on Sakhalin Island. Individuals well-being is influenced by a feeling that their expectations are being met. Realisation of some of the positive expectations will have a positive impact on well being.

12.3 INCREASE OF PROJECT DEMAND ON INFRASTRUCTURE

Risk matrix ranking: Low

The demand on health and other infrastructure due to the Project is anticipated to reduce following the completion of construction activities. Alternatives for gas supply for power and supply are discussed in the SIA.

12.4 HEALTH IMPACTS ASSOCIATED WITH LOGISTICS

12.4.1 Road Traffic Accidents

Risk matrix ranking: Low

Operational activities may lead to an increase in road traffic in some areas. Overall this will be much less than during construction, therefore the level of impact will not be significant.

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12.4.2 Travel health hazards

Risk matrix ranking: Low

Health hazards associated with travel during the operational phase are not expected to differ to those identified for the construction phase. However, the number of journeys and the number of people exposed will be lower during operational, which means that risks are considerably reduced.

12.4.3 Increased demand for waste management

Risk matrix ranking: Medium

SEIC recognises the increased requirements for waste management throughout the life of the Project and has proposed a plan to local authorities to upgrade some landfill sites and develop a hazardous waste facility. This is expected to have a positive impact on the management of waste for Sakhalin Island during the operational phase.

12.5 HEALTH ISSUES - NON IMPACTS

12.5.1 Immunisation

Community immunisation programmes are already active and immunisation issues are not expected to be significant during the operational phase.

12.5.2 Smoking

Whilst it is expected that a certain percentage of the operational workforce will smoke, their activities in this regard are not likely to influence or affect the Sakhalin population due to the already high incidence of smokers and the low numbers of the workforce.

12.5.3 Cardiovascular Disease

Changes in the socio-economic situation may reduce cardiovascular disease for some of the population. However there are many risk factors such as poorly controlled hypertension, diabetes, smoking, therefore it is difficult to predict whether cardiovascular disease will increase or decrease.

12.5.4 Liver Disease

The incidence of liver disease will be influenced by alcohol use and the prevalence of chronic hepatitis B and C. These items have been previously discussed.

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