

ALDERON IRON ORE CORP.



AMENDMENT TO THE ENVIRONMENTAL IMPACT STATEMENT
VOLUME 3 APPENDICES – INFORMATION REQUEST RESPONSES

Appendix S

Literature Review on Mining Shift Work

Literature Review on Health, Social and Economic Effects of Shift Work, Rotational Shifts, Extended Workdays and Commute Work on Mine Workers and their Families

Though mining is a strong economic contributor in Labrador, little information is available on the effects of mining on the health and wellbeing of the industry's workers. Shift work is a reality for more than 25% of working Canadians and much of the literature relates collectively to various industries (e.g. health care, transportation, hospitality, policing, emergency response, security, mining and industrial work) where shift work is the norm. A body of research is currently being developed on commute work which is common in the mining industry in northern Canada and Western Australia.

Research demonstrates that long-term shift work, especially nights, contributes to certain health conditions and potentially to others though the evidence is less conclusive for some illnesses. Other links to health issues have been proposed but not clearly demonstrated. Shift work and extended workdays contribute to fatigue and related incidents but programs for managing fatigue may help to reduce effects. Any individuals' health is also linked to complex factors including heredity and lifestyle.

Shift workers and their life partners are more likely than permanent day workers and families to feel compromised in relation to family life and shared responsibilities. Conversely, many workers state that shift work provides more days off to spend with family and friends. Work-life balance issues are common for all working people, especially those with children. However, above average incomes provided by mining jobs facilitate opportunities for individuals and families to participate in recreational and traditional activities. Whether or not shift work is suitable depends on individual circumstances.

Similar to shift workers, fly-in / fly-out (FIFO) workers express lower life and job satisfaction than other workers. However, many FIFO workers find the arrangements suitable particularly since they are well paid, enjoy extended time off, live where they choose and do not relocate their families for work. Workers with young children and those who work rosters of three weeks or more tend to find FIFO most stressful. Where support is available to workers and families it can help them to adjust to FIFO and make home-to-work transitions more successful.

Literature Review

The following paragraphs provide the results of a brief literature review on the socioeconomic effects of shift work, extended workdays and commute rotations on workers and their families. Where possible, information is provided on Newfoundland and Labrador. The summaries offer information on the scope of the studies to show their level of extensiveness and statistical validity. Where recommendations for improved management of shift work were discussed, these are noted.

Canadian Centre for Occupational Health and Safety. 2010. Rotational Shiftwork. Available at: www.ccohs.ca. Accessed: January 2013.

About 25 percent of the North American population works shifts in a variety of sectors. Shift work (particularly night shifts) disrupts the body's 24-hour biological cycles, which include sleep-wake patterns, body temperatures and hormone level. Compared to day workers, many shift workers state that shifts interfere with their family and personal life. Shift work, particularly nights and over a long period of time, has been linked to health issues such as chronic fatigue, cancer and gastro-intestinal

disorders, and potentially to other illnesses and aggravation of existing conditions. The agency offers recommendations for optimizing design of shift schedules and for coaching workers in the importance of a healthy diet and adequate sleep.

Saunders, Dr. Ron. 2010. Shift work and health. Canadian Institute for Work & Health. April 2010.

This article describes the relatively large body of literature on the likely connections between shift work and worker health. The research clearly shows that people who work night shifts, and possibly early morning shifts, have shorter sleep duration and poorer quality of sleep than those who work regular day shifts. Workplace injuries tend to occur increasingly from day to evening to night shift. Shift work (particularly nights) disrupts circadian rhythms and over a long period of time may be carcinogenic to humans. The author recommends more high quality studies to evaluate the links between shift work and health, specific analyses of different types of shifts, whether different individuals are more susceptible to adverse effects of shift work and the effectiveness of interventions designed to mitigate these effects.

Canadian Centre for Occupational Health and Safety. 2010a. Extended Workday: Health & Safety Issues. Available at: www.ccohs.ca. Accessed: January 2013.

Extended workdays usually, but not always, mean a compressed work week of 3-4 days. They are common in many types of work and workers enjoy having more consecutive days off for family time, rest and leisure. Conversely, workers may state that longer work days result in fatigue, potential work related incidents and more rest and recovery time is needed following several consecutive long shifts. The agency offers guidelines to apply when evaluating the use of extended workday schedules.

National Institute for Occupational Safety and Health. 2004. Overtime and Extended Work Shifts: Recent Findings on Illness, Injuries, and Health Behaviours. U.S. Department of Health and Human Services.

Based on a literature review of 52 publications examining overtime and extended work shifts, research has increased but is still inconclusive. Recent research indicates that the influence of overtime and extended shifts on worker health and safety may involve a complex interaction of several work schedule characteristics as well as work tasks, individual worker characteristics, compensation, commute time, occupational exposures and personal control over schedules.

Leary, Caitlin. No date. A study of the health and safety aspects of shiftwork and rosters at the PCML. Mineral Industry Safety and Health Centre, University of Queensland.

This study evaluated the safety risk and health aspects of shiftwork and rosters at one mine site, the Pasminco Century Mine Limited (PCML) in Queensland Australia, which has a fatigue management program. The research showed that after an initial adjustment period to night shifts, fatigue did not increase. Sleep quality did not deteriorate following multiple shift cycles and was not dependant on whether or not a worker was sleeping at work site accommodations or at home. There was no demonstrated link between shift cycles, rosters and accidents / incidents.

Williams, Cara. 2008. Work-life Balance of shift workers. Perspectives August 2008. Statistics Canada – Catalogue no. 75-001-X.

This report is based on the Statistics Canada General Social Survey with a sample size of 19,600 full time workers throughout Canada. In 2005, 28% of employed Canadians worked some sort of shift and

two-thirds of these worked rotating or irregular shifts. Shift work can have adverse health effects and shift workers tend to be more dissatisfied with work-life balance than regular day workers. However, depending on the personal situation and the type of shifts worked, shift work can have advantages for participating in family and activities including child or parental care.

Labrador West Status of Women Council and Femmes Francophones de L'Oust du Labrador. 2004. Effects of Mining on Women's Health in Labrador West. November 7, 2004.

The Labrador West study team interviewed 29 women of which 34% indicated that their lives were affected by shift work whether they or their spouses worked shifts. Spouses of shift workers indicated that they felt the need to accommodate their partner's schedule and took more responsibility for family care. They felt lonely when spouses were working especially on weekends and at other times due to the men's desire to participate in social and recreational activities on days off. Women who worked shifts felt physically unwell and found that their work conflicted with family care responsibilities.

Shandro, Janis A. et al. 2011. Perspectives on community health issues and mining boom-bust cycle. Resources Policy (2011), doi: 10.1016/j.resourpol.2011.01.004.

This paper explores community health issues, as described by 10 health care professionals, associated with the mining boom-bust cycle in Tumbler Ridge, a coal mining town in northern British Columbia. For many families, at least one parent worked at the mine. Shift work may result in less time for family or participation in traditional activities. However, depression and anxiety are associated with lack of work during periods when mining is less active.

Gibson, Ginger and Jason Klinck. No date. Canada's Resilient North: The Impact of Mining on Aboriginal Communities. Pimatisiwin: A Journal of Aboriginal and Indigenous Community Health 3(1).

This literature review discusses the effects of mining on communities in the Northwest Territories. Mine workers felt that shift work is stressful due to fatigue from lack of proper sleep and can result in a range of effects from inattentiveness to depression.

Knotsch, Cathleen et al. 2010. Research and information needs concerning community health impacts and benefits from mining – A 2010 community visit report. Ottawa: National Aboriginal Health Organization.

Based on interviews with 33 Inuit residents of Baker Lake and Rankin Inlet, mining shift work is described as disruptive to family life and associated impacts include increased substance abuse, jealousy, family violence, child neglect, poor performance in school children and fewer opportunities to participate in traditional activities. Interviewees noted that mining income was welcome and that positive and negative impacts occur simultaneously.

Clifford, Susan. 2009. The Effects of Fly-in/Fly-out Commute Arrangements and Extended Working Hours on the Stress, Lifestyle, Relationship and Health Characteristics of Western Australian Mining Employees and their Partners: Preliminary Report on Research Findings.

Researchers interviewed 222 Western Australian mining employees and life partners about the effects of 12-hour shifts, night shifts and FIFO work arrangements on stress, lifestyle, relationships and health.

A sub-group of 32 worker participants also provided daily saliva samples throughout their work roster to assess physiological stress levels (measured in cortisol concentrations). The results largely disputed anecdotal evidence as FIFO employees and partners were generally no more likely to have high stress levels, poor quality relationships or adverse health behaviours than direct commute employees or the population in general. However, a small portion of FIFO workers and partners found this work arrangement to be particularly stressful. The researchers recommended improving roster design and providing tailored assistance to those vulnerable to finding FIFO lifestyle stressful.

Australian Centre of Excellence for Local Government. 2012. Scoping Study: Impact of Fly-In Fly-Out / Drive-In Drive-Out Work Practices on Local Government. May 2012.

This study reviewed literature related to FIFO and drive-in / drive-out (DIDO) to describe key issues related to the impact on communities and local government. The existing literature suggests that FIFO employees and families experience adverse health (mental and physical) and social effects. It also purports that FIFO workers have a set of advantages including high wages and lower living costs, uninterrupted periods of time with family and the ability to make favourable lifestyle choices. Therefore, Australian research on the effects of FIFO on employee health and well-being, partner and family relationships and psychological stress reveal conflicting and inconclusive results. However, the nature of work rosters and support networks play an important role in determining the extent to which individual workers and their families are adversely affected.

Storey, Keith. Fly-in/Fly-out: Implications for Community Sustainability. Sustainability 2010, 2, 1161-1181; doi: 10.3390/su2051161.

This literature review discusses the community effects of FIFO in northern Canada and Western Australia. Opportunities for FIFO work in western Canada has allowed Newfoundland workers displaced by decline in other sectors (e.g. fishery, fish processing, ship building and between large scale construction projects), to secure regular work and lucrative incomes. This also allows workers to continue living in their home regions and prevents disruption of family life caused by relocation. Additionally, these workers spend most of their income where their families reside and thus bring new money in those communities.

Gent, Vanessa. 2004. The Impact of Fly In / Fly Out Work on Well Being and Work-Life Satisfaction.

A survey of 132 FIFO workers in Western Australia revealed specific information on the effects of FIFO on life and work satisfaction. FIFO workers experience lower life and job satisfaction than established norms for general workers. Lowest life satisfaction occurs among FIFO workers with children five years of age and under. The least job satisfaction was felt by those FIFO workers who worked rotations of three or more weeks away from home. The researcher makes recommendations for length of rosters and support programs for workers.