Noteworthy Decision Summary

Decision: WCAT-2005-04230-RB **Panel:** Guy Riecken **Decision Date:** August 11, 2005

Causation – Osteoarthritis of the Hands – Chainsaw Vibrations – Section 6 of the Workers Compensation Act – Items #26.04 and #26.22 of the Rehabilitation Services and Claims Manual, Volume I

A worker must establish that it is more likely than not that the chainsaw vibrations caused the osteoarthritis in his hands. A worker cannot rely on general literature which associates different kinds of vibrations with different forms of osteoarthritis in workers in different fields. Where a worker's symptoms worsen throughout the workday and improve when he is off work, it is reasonable to conclude that the work aggravated the worker's pre-existing condition.

The worker was employed as a tree faller for over 40 years when he experienced the onset of pain in his hands. The diagnosis was osteoarthritis (OA) of the third metacarpophalangeal (MCP) joint bilaterally, worse on the right hand. The pain was mild in the morning, but worsened as he used a chainsaw at work. After being off work for a while, his hands flared up again during an attempted return to work. The worker attributed the problems with his hands to the vibrations from the various chainsaws he used over the years. His claim was denied by the Workers Compensation Board (Board) and he filed an appeal with the Workers' Compensation Review Board, which was transferred to WCAT pursuant to the *Workers Compensation Amendment Act (No. 2)*, *2002*.

Since there was no evidence of a traumatic incident or a series of traumatic incidents, the claim is more appropriately considered under section 6 of the *Workers Compensation Act*, pertaining to occupational diseases. Since OA is not designated or recognized as an occupational disease by statute or regulation, item #26.04 of the *Rehabilitation Services and Claims Manual, Volume I* (RSCM 1) applies, and the panel must determine, under item #26.22 of the RSCM I, whether the disease is due to the nature of the worker's employment, on the merits of the case without the benefit of any presumption.

The panel carefully analyzed the evidence of each of the physicians, including the medical literature cited. Some of the studies established a causal connection between specific occupations and OA, but the worker did not establish a connection between those occupations and tree-falling. Other studies established a causal connection between certain vibrating hand tools and OA, but the worker did not present anything showing a similarity between the vibrations of those tools and the vibrations of a chainsaw. The studies specific to the lumber industry did not provide any reliable conclusions regarding OA.

The worker presented insufficient evidence to conclude that the OA of his hands was due to his employment as a chainsaw operator. It is more likely that the OA was a naturally occurring degenerative condition. The panel went on to consider whether the worker's pre-existing disease was aggravated by work activities to the point where the worker was thereby disabled. The fact that the pain worsened over the course of a workday and when the worker attempted a return to work after being off, supported a causal relationship between the employment activities and aggravation of the OA symptoms. None of the physicians suggested that the worker's OA would probably have become disabling around the time it did regardless of his employment

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activities. The panel found that the worker suffered a temporary disabling aggravation or aggravations of his OA due to his employment as a chainsaw operator, and the matter was sent back to the Board to determine the extent and duration of the worker's entitlement.

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WCAT Decision Number: WCAT-2005-04230-RB
WCAT Decision Date: August 11, 2005
Panel: Guy Riecken, Vice Chair

Introduction

The worker was employed as a tree faller in February 1997 when he experienced the onset of pain in his right hand. When he sought medical attention on June 23, 1997 he had symptoms in both hands. The diagnosis was osteoarthritis (OA) of the third metacarpophalangeal (MCP) joint bilaterally, worse on the right hand. He went off work in July 1997, returned to work, and went off work again in November 1997.

The worker appeals the August 27, 1997 and February 17, 1998 decisions of the Workers' Compensation Board (Board). In the August 27, 1997 decision a claims adjudicator disallowed the worker's claim for the degenerative condition in his right hand under both section 5(1) and section 6(1) of the *Workers Compensation Act* (Act). In the February 17, 1998 decision a different claims adjudicator reviewed the claim after receipt of new medical evidence and decided that there was no new medical information that would warrant a change in the August 27, 1997 decision.

The employer filed a notice of participation in both appeals. The two appeals were heard together on May 13, 2005 in Richmond, B.C. The worker and his legal counsel, Murray Lott, attended the hearing. The employer did not participate in the hearing, although notified of it.

Issue(s)

Whether the worker is entitled to compensation under either section 5(1) or section 6(1) of the Act in relation to his bilateral hand OA.

Jurisdiction

These appeals were filed with the Workers' Compensation Review Board (Review Board). On March 3, 2003, the Appeal Division and Review Board were replaced by the Workers' Compensation Appeal Tribunal (WCAT). As these appeals had not been considered by a Review Board panel before that date, they have been decided as WCAT appeals. (See the *Workers Compensation Amendment Act (No. 2), 2002*, section 38.)

WCAT may consider all questions of fact and law arising in an appeal, but is not bound by legal precedent (section 250(1) of the Act). WCAT must make its decision on the merits and justice of the case, but in so doing, must apply a policy of the board of

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directors of the Board that is applicable in the case. WCAT has exclusive jurisdiction to inquire into, hear and determine all those matters and questions of fact, law and discretion arising or required to be determined in an appeal before it (section 254.)

These are appeals by way of rehearing, rather than a hearing *de novo* or appeals on the record. WCAT has jurisdiction to consider new evidence, and to substitute its own decision for the decision under appeal.

Background and Evidence

At the time of the first medical report dated June 23, 1997 from the worker's attending physician, Dr. Germain, the worker was continuing to work. The report indicates that the worker complained of pain in his right hand that began in February 1997, but was not bad enough to stop working. However, he reported that for the past three weeks the pain had been more severe and he could not start the chainsaw with his right hand. He said that when he started work in the morning the pain was mild but worsened as he worked. He indicated the pain was in the third MCP joint of the right hand. The right hand was often swollen and red, and it hurt to move the third finger. He also complained of pain in the left wrist for the past two months. On examination, Dr. Germain noted that the right hand pain was increased with palpation of the third MCP joint. There was no swelling at the time of the examination. There was full range of motion of the third finger of the right hand, but flexion caused pain. Dr. Germain diagnosed possible OA of the right third MCP joint and mild de Quervain's tenosynovitis of the left wrist. Dr. Germain prescribed Naprosyn and ordered an x-ray.

Dr. Germain saw the worker again on June 26, 1997. The worker was still at work, but complained that the right third MCP was very sore after a few hours of work. The left wrist was stable. Dr. Germain noted that the x-rays showed spurs on the head of the third MCP bilaterally, with the one on the right side significantly larger. The radiologist had raised the possibility of hemochromatosis. Dr. Germain ordered a workup for hemochromatosis and recommended the worker could continue to work while taking Naprosyn.

When the worker saw Dr. Cavacuiti on July 7, 1997 his right third MCP had not improved. On examination, it was swollen and tender. He was still working. Dr. Cavacuiti renewed the prescription for Naprosyn and referred the worker for physiotherapy.

The worker saw Dr. Levins on July 24, 1997. His symptoms had not improved. There was slight swelling over the right third MCP, full range of motion and strong grip despite the pain. The worker did not tolerate Naprosyn and would try ibuprofen instead.

A medical report dated August 5, 1997 from Dr. Heffernan indicates that the worker had last worked on July 18, 1997. After being off work for an unspecified time his hands had flared up again during an attempted return to work. Dr. Heffernan indicated that tests

had ruled out hemochromatosis, and therefore the diagnosis was degenerative changes to the hand joints secondary to power saw use. She requested a referral to the Board's Hand Clinic and vibration cushioning gloves.

In a memo dated August 25, 1997 (memo #2) Dr. W1, a Board medical advisor (BMA), reviewed the medical reports and noted the worker had bilateral degenerative arthritis in his hands. He did not see a connection between the bilateral spurs on the third MCP joints and work. He commented that the work may have aggravated them and made them more symptomatic, but it did not cause them.

The claims adjudicator relied on Dr. W's opinion in disallowing the worker's claim for his right hand degenerative condition.

The worker saw Dr. Rimmer on September 25, 1997. His right hand was sore, especially over the right third MCP joint. It was made worse by using the chainsaw. There was tenderness at the right third MCP joint and modest swelling. Range of motion was normal. The worker had a sore left wrist. There was a positive Finkelstein's sign. The worker could return to work as tolerated.

The worker saw Dr. Sproul, a cosmetic, plastic and reconstructive surgeon on October 10, 1997. In her report dated November 27, 1997 she opined that the intensity of the worker's job working with a chainsaw has certainly brought on the degenerative changes and was causing his hand pain. He was unable to continue working as a tree faller as his job was making his condition worse.

In his application for compensation dated December 1, 1997 the worker indicated that he had been off work since November 14, 1997. He described his injury as swelling of his right hand and left hand, wrist and forearm. He attributed this to vibrations from long-term chainsaw use.

Dr. Sproul's December 16, 1997 progress report referred to the x-ray that showed degenerative changes and to the worker's complaints of bilateral chronic hand pain. She indicated that he was unable to work. This information was repeated in Dr. Sproul's January 16 and February 11, 1998 reports.

On February 5, 1998 Dr. W2, an occupational health medical advisor at the Board, stated that he was unable to support the worker's employment as being the likely cause of the arthritic changes in the hands. He also stated that no matter what the cause of the worker's arthritis, he had no doubt that operating a chain saw will increase the symptoms of his hand arthritis on a temporary basis, but this would not cause any significant aggravation of the underlying pathology or disease.

The claims adjudicator relied on Dr. W2's opinion in deciding that there was no new medical information on which to change the August 27, 1997 decision.

New Evidence

The worker's previous representative, Jim Parker, submitted copies of the following medical articles in support of the worker's appeal:

- M. Bovenzi, L. Petronio, and F. DiMarino, "Epidemiological Survey of Shipyard Workers Exposed to Hand-Arm Vibration." Int Arch Occup Environ Health. 1980; 46(3):251-66.

- M. Bovenzi, A. Fiorito and C. Volpe, "Bone and Joint Disorders in the Upper Extremities of Chipping and Grinding Operators." Int Arch Occup Environ Health, 1987, 59(2):189-198

- M. Bovenzi, "Medical Aspects of the Hand-Arm Vibration Syndrome," 1990 Int J Ind Ergon.

- J. A. Burkhart, "Muscoskeletal Diseases in Lumber and Wood Products Workers as Identified Through Hospital Records Surveillance," *American Journal of Industrial Medicine 4: 728 – 732 (1983)*.

- G. Fam and A. Kolin, "Unusual Metacarpophalangeal Osteoarthritis In A Jackhammer Operator," Arthritis and Rheumatism, Vol. 29, No. 10 (October 1986).

- G. Gemna and H. Sarasla, "Bone and Joint Pathology in Workers Using Hand-Held Vibrating Tools," Scand. J. Environ. Health. 1987 Aug; 13(4): 290-300.

- Tzvetkov, Boev, and Baykoushev, "Vibrations, Discriminant Models and Possibilities for Prognosticating Specific and Non-Specific Effects On the Organism" 1992 Ann. Occup. Hyg. 1992 June; 36(3): 253-64.

Mr. Parker submitted that these articles support a relationship between hand-arm vibration and OA.

Mr. Lott provided further documentary evidence to WCAT: a report dated February 18, 2004 from Dr. McGraw, an orthopaedic surgeon and professor of orthopaedics, and the July 12, 2004 ergonomic assessment report from Judy Village, an ergonomist.

At the oral hearing the worker testified that he had worked in logging from 1954 to 1997, taking time off during that period only as a result of weather conditions such as snow. He started logging in Quebec, and then worked in Ontario and Alberta before moving to B.C. in 1962. His first job in B.C. was cutting slash for a pipeline in the Prince George area. He moved to the coast in 1972. He worked in logging on the coast until 1997, working seven or eight months per year, and spending the rest of the year "relaxing." During his first couple of years of logging in Quebec he worked with cross-cut saws

before the first gear drive chainsaws appeared in the 1950s. He later switched to direct drive chainsaws when they came into use. The worker brought a chainsaw to the hearing and demonstrated how he holds it, with his right hand on the lower handle at the back of chainsaw that has the trigger in it. His left hand was on the upper handle and is used to steady the saw and apply pressure. He held various kinds of saws in this same way over the years. He pointed to the lower forearm and hand on both sides as the areas in which he felt the most vibrations when working with chainsaws. The vibrations were not felt in a certain place, but everywhere in the hands.

The worker described the onset of his symptoms in 1997. Initially there was swelling without pain. This happened in both hands in early 1997. He took two days off and then returned to work. When he went back to work the same thing happened again. Eventually, after seeking medical treatment, he decided he could no longer work and that he had to retire. He testified that now his pain is not too bad, but there is some pain in both hands. Sometimes the pain in his hands prevents him from sleeping.

The worker testified that before 1997 he never had problems with his hands. He pointed to the base of the long finger on his right hand and the MCP joint of that finger as the sight of the pain he now has. He stated that the pain does not go to other fingers on that hand. He also pointed to the wrist area above his thumb on his left hand as the site of symptoms. He believes that the vibrations from the various chainsaws he has used over the years caused the problems he has with his hands. When working in logging he would typically work from 8:30 in the morning to 3:30 in the afternoon and estimated that each day he would be running a chainsaw for five to seven hours. He described the vibrations in the older saws that he used as worse than the newer saws, which are much better and do not have too much vibration. He estimated that the chainsaws started to get better around 1986. He used to work with a Husqavarna saw, but around 1996 changed to a Stihl, although he thought the latter saw had more vibrations. The worker stated that throughout his working life he wore nylon work gloves while operating chainsaws. He wore them to protect the backs of his hands and wrists from being scratched and cut by brush and tree branches while he worked. He demonstrated the thickness of the gloves by pointing to the top edge of a Styrofoam cup in the hearing room. During the hearing this was estimated to be approximately one-eighth of an inch thick.

Submissions

Mr. Lott submits that the Board medical advisors conceded that the worker's occupation likely had significance in aggravating his OA. He submits that the report from Ms. Village, which includes a review of epidemiological evidence, establishes at least a prima facie case that there is a scientific link between chainsaw operation and the development and aggravation of OA of the hand. Mr. Lott also emphasizes that Dr. McGraw points out that the locus of the worker's right hand OA is atypical for idiopathic development and this makes an extrinsic cause more likely. No known causal agent other than long-term exposure to vibration is postulated. Mr. Lott submits that

exposure to vibration is accepted in the scientific literature as a likely cause of OA. However, even assuming an idiopathic genesis of the condition, there is agreement in the medical evidence that operating chainsaws would likely aggravate the condition of bilateral OA. Therefore, Mr. Lott argues, the case is made out on an aggravation basis.

Mr. Lott refers to two Appeal Division decisions, *Appeal Decisions #99-1868 and #2002-2499,* for the principle that there does not need to be scientific certainty in the epidemiological literature before it can be accepted in a compensation case that vibration has the capacity to contribute to a disorder. The decision-maker need only be convinced that it is more likely than not that vibration has that capacity.

Mr. Lott requested reimbursement of the full expenses of obtaining the reports from Dr. McGraw and Ms. Village. He submitted that the appeal involves scientific issues with respect to a causal relationship between vibration and hand OA, and that the reports were required to address those issues.

Findings and Reasons

With regard to Mr. Lott's comment about the standard of proof, I note that in *Appeal Decision #2002-2499* the panel made the following statement with regard to scientific evidence and the standard of proof in compensation cases:

> We do not consider that there must be scientific certainty in the epidemiologic literature before we can accept that WBV [whole body vibration] has the capacity to contribute to low back disorders. We consider that we only need to be convinced that it is more likely than not that WBV has that capacity. This is so because we are rendering a quasi-judicial decision which requires a lower level of proof than that sought in matters of science.
>
> We, like other decision-makers in administrative law, and perhaps most other fields of law, are not bound by scientific standards of proof. Those standards likely exceed proof beyond a reasonable doubt, a standard well beyond the civil standard. Judges and quasi-judicial decision-makers utilize different burdens of production and proof.
>
> That scientific standards of proof are different does not mean we dispense with critical analysis of the epidemiologic evidence. That analysis is part of our decision-making process. We need to ensure that we keep in mind the source of any comments on the literature as the viewpoint of the commentator is relevant.

I agree with the foregoing comments. In assessing the evidence in this case, including the scientific reports that contain epidemiological evidence, I have considered whether or not the evidence supports various findings of fact based on a balance of probabilities,

while keeping in mind the requirement in section 250(4) of the Act that if the evidence supporting different findings on an issue is evenly weighted I must resolve that issue in a manner that favours the worker.

Under section 5(1) of the Act the worker is entitled to compensation if he suffered a personal injury that arose out of and in the course of his employment. Policy item #14.20 in the *Rehabilitation Services and Claims Manual, Volume I* (RSCM I) provides that it is not a bar to compensation when an injury occurs over a period of time rather than resulting from a specific incident. To be compensable, the evidence must warrant a conclusion that there was something in the employment that had causative significance in producing an injury.

In this case the evidence does not indicate that prior to the onset of his symptoms the worker experienced a traumatic incident or series of traumatic incidents over time that would lead to acceptance of a claim for a personal injury under section 5(1) of the Act. I find that his claim is more appropriately considered under the provisions pertaining to occupational diseases. This approach is consistent with policy item #13.10 of the RSCM I, which discusses the distinction between injury and disease, and which states that OA is classified as a disease.

Section 6(1) of the Act provides that:

> 6(1) Where
>
> (a) a worker suffers from an occupational disease and is thereby disabled from earning full wages at the work at which the worker was employed or the death of a worker is caused by an occupational disease; and
>
> (b) the disease is due to the nature of any employment in which the worker was employed, whether under one or more employments,
>
> compensation is payable under this Part as if the disease were a personal injury arising out of and in the course of that employment. A health care benefit may be paid although the worker is not disabled from earning full wages at the work at which he or she was employed.

"Occupational disease" is defined in section 1 of the Act as:

> any disease mentioned in Schedule B, and any other disease which the Board, by regulation of general application or by order dealing with a specific case, may designate or recognize as an occupational disease, and "disease" includes disablement resulting from exposure to contamination.

OA is not found in Schedule B or in the list of occupational diseases recognized by regulation. However, under sections 1 and 6(1) OA can be recognized as an occupational disease by an order dealing with a specific case.

Policy item #26.04 of the RSCM I, "Recognition by Order Dealing with a Specific Case," explains that the lack of prior designation or recognition by the Board of a disease as an occupational disease does not mean a claim for such disease will not be considered on its merits. If the merits and justice of an individual claim for such a disease warrant its recognition as an occupational disease, the Board may do so "by order dealing with a specific case." The effect of such an order is to accept the claim for compensation purposes without establishing an institutional memory for decision-makers or an expectation for others who may suffer from that disease that the disease may be due to the nature of some employment. In other words, the disease will be recognized as an occupational disease limited to the specific facts of that individual claim.

Policy item #26.22 of the RSCM I, entitled "Non-Scheduled Recognition and Onus of Proof," provides that the decision whether or not a disease is due to the nature of the worker's employment is determined on the merits and justice of the case without the benefit of any presumption. If there is no or insufficient positive evidence that tends to establish that the disease is due to the nature of the worker's employment, the claim is denied.

In this case there are conflicting medical opinions about whether the worker's OA of the hands is due to the nature of his employment as a tree faller. Dr. W1 and Dr. W2 were of the view that the OA was not due to the worker's employment. Dr. Sproul, Dr. McGraw and Ms. Village opined that the OA resulted from his exposure to the vibrations from the chainsaws the worker used over the years in his job.

In his August 25, 1997 memo, Dr. W1 reasoned that if the worker's OA were due to the chainsaw vibrations, he would expect to see it more generally throughout the hand, and not just in the MCP joints. I do not find this to be a convincing analysis, since the same could be said of OA that occurs naturally rather than from an occupational cause. If it occurs naturally it would be expected to appear more generally throughout the joints of the hands. As Dr. McGraw points out in his report (which is discussed below), the MCP joints are not typical sites for idiopathic OA. I accept as factual that part of Dr. McGraw's report, and I give limited weight to the opinion of Dr. W1.
Dr. W2, a medical advisor in the Board's occupational health section, stated in his February 5, 1998 memo that during the 25 years he has worked in occupational health, his experience is that arthritic changes in the hands are no more common or serious amongst tree fallers and other chainsaw operators than in other labour intensive occupations. He also states that he is not aware of good or consistent evidence in the medical literature which shows a cause and effect relationship.

I consider Dr. W2's opinion to be based, to some extent, on the anecdotal evidence of his own experience in dealing with chainsaw operators and other workers over the course of 25 years in the field of occupational health. Although he sites lack of evidence for a causal relationship in the medical literature, he does not cite any studies or literature reviews that specifically address a causal relationship between chainsaw use and OA of the hands. In these circumstances, I would place a limited amount of weight on Dr. W2's opinion on its own. However, for the reasons set out below, I find Dr. W2's opinion to be consistent with the scientific reports cited by Ms. Village in her report and those submitted by Mr. Parker. Based on the scientific reports that are available in this case, I agree with Dr. W2's comment with respect to a lack of support in the medical literature for a causal relationship between OA of the hands and the operation of chainsaws.

Dr. McGraw's February 18, 2004 report acknowledges that the initiation of OA is not well understood. He states that it involves systemic, genetic and environmental factors. With regard to the cause of the development of OA, Dr. McGraw states that "It is hypothesized that repeated microtrauma affecting the joint could provoke micro fractures in the subchondral bone that, in turn, may modify the biochemical qualities of the cartilage in the environment of these micro fractures." He goes on to cite the "Primer on Rheumatic Diseases" in explaining that these micro fractures would cause the bone to synthesize growth factors that can result in the production of osteophytes and osteosclerosis. He also cites the same text as the source of the statement that occupations associated with high rates of OA include farmer (hip OA), jackhammer operator (elbow OA), miner (knee and spine OA) and cotton mill worker (hand OA). Dr. McGraw concludes that is it probable that the long period of operating a chainsaw has either caused, aggravated or accelerated the worker's osteoarthritic condition. He considers it significant that the worker's right long finger MCP joint is the site of disabling OA, since primary or idiopathic OA is very atypical for this joint. He concludes that the OA in the MCP joint is the result of repetitive micro trauma related to the operation of chainsaws.

There are three elements in Dr. McGraw's analysis. One is the recognition that some occupations are associated with high rates of OA. The second is the identification of a biological mechanism of injury, namely the production of micro traumas by vibration, and the third is the relative rarity of MCP joint OA. I find that the first two do not provide support for his conclusion. The occupations listed by Dr. McGraw as associated with high rates of OA do not include the worker's occupation. Nor does his report explain the risk factors in those occupations for the development of OA. It is therefore not clear what the worker's occupation may have in common with the occupations that have been identified with OA. There is, for instance, no apparent connection between OA of the hip in farmers or OA of the knee and spine in miners and the use of chainsaws by loggers. Even accepting that the occupations mentioned by Dr. McGraw involve vibrations that are related to OA, this does not mean that the vibrations from chainsaws is also a risk factor for OA. Secondly, in describing the mechanism by which vibration causes micro traumas which lead to OA, Dr. McGraw characterizes it as a hypothesis,

not as a widely accepted cause of OA. As to the third element of Dr. McGraw's analysis, while I accept that OA in the MCP joint is more rare than in some other finger joints, I do not find this on its own to be sufficient to conclude that the worker's OA was likely due to his employment. To the extent that there are differences between the opinions of Dr. W2 and Dr. McGraw, I place more weight on the opinion of Dr. W2.

Ms. Village explains in her report that she interviewed the worker to obtain detailed information about his work history. She also conducted a literature review, using the terms "osteoarthritis," "work-related," "risk factors," "hand arm vibration," and "chainsaws." In addition she conducted a search related to chainsaw vibration levels and types. She reviewed the abstracts found from the searches and obtained what she considered to be key articles.

From her literature search Ms. Village observed that the work-relatedness of OA has not been extensively studied. She cites a study (Rossignol, et al., 2003) and the textbook "Work-Related Musculoskeletal Disorders, A Reference Book for Prevention" (Hagberg et al 1995), as supporting a relationship between occupational stresses and OA. The study by Rosignol et al. surveyed 10,412 symptomatic patients in France. Occupation and other variables for that group were compared to data from the National Survey on Health Impairment and Disability in France. The study reported that OA began on average at 57 years of age with no difference between men and women. The knee was the most affected joint, followed by the hip and the hands. Two occupational groups stood out: industrial unskilled labourers and motor vehicle drivers. The highest proportion of totally disabled workers due to OA was found to be blue collar workers, with a rate three times higher than agricultural workers. Ms. Village comments that the most important finding from this survey was that certain occupational groups have excess OA prevalence, confirming work-relatedness. However, I note that the study does not provide information on OA in specific body parts, and it discusses broad occupational categories ("blue collar," "agricultural") rather than specific occupations. It does not include information on OA in occupations using chainsaws. While I agree with Ms. Village's comment that this study demonstrates a relationship between some occupational categories and the prevalence of OA, I do not find the study to support a causal relationship between exposure to chainsaw vibrations and OA of the hand.

The text by Hagberg et al. also supports the work-relatedness of OA, and addresses occupational exposure to hand arm vibration. As quoted by Ms. Village, the text hypothesizes that:

> vibration may impair muscle strength and cause osteoarthrosis. The disorders linked to vibration are primarily osteoarthrosis of the joints of the upper limbs, for example, osteoarthrosis of the wrist and elbow amongst pneumatic drill operators and osteoarthrosis of the acromioclavicular joint.

Ms. Village notes that the authors of the text go on to explain that this effect is thought to be related to vibration interfering with prehension and altering the sensation of the

hand mechanoreceptors, leading to overgripping to maintain control of the object with extra muscle activation leading to higher muscle loads. I note, however, that Ms. Village does not suggest that the textbook includes any epidemiological information on the link between chainsaw operation and OA of the hands.

Ms. Village also cites three published articles that have specifically found an association between OA in the wrists and hands and occupational exposure to vibrating hand tools: Kumlin et al., 1973; Bovenzi et al., 1987 and Bovenzi et al., 1980. I obtained copies of these three studies as well as the Rosignol study discussed above and considered them along with the other evidence in this appeal.

Of the three articles, only the Kumlin study looked specifically at radiological changes in the carpal, metacarpal and phalanges bones in relation to chainsaw vibration. Thirty-five lumberjacks in Finland with extensive chainsaw experience who had been seen at the Institute of Occupational Health in Finland for upper limb symptoms were examined and compared to a control group. Radiological changes, described as "vacuoles" (defined as big cysts in the report), were found in 20% of the lumberjacks studied. In addition, three of them were found to have arthrotic changes in the wrists or hands. As compared to the control group, the lumberjacks had larger diameter cysts and the locations were different. The authors of the report conclude that the vacuoles, particularly in the carpal region, were a radiological change caused over time by vibration.

In reviewing the Kumlin study, I note that the authors did not discuss the relationship, if any, between OA and the vacuoles, or large cysts, seen in the lumberjacks' x-rays. The report refers to the OA findings as additional to the vacuole findings, leading me to conclude that the authors did not consider the vacuoles to be related to OA, but as separate radiological findings. I do not consider this report to provide significant evidence of a causal relationship between exposure to chainsaw vibrations and OA of the hand and wrist. Of the 35 lumberjacks studied, three, or less than 10%, were described as having radiological evidence of OA in the hands. The report did not compare this to the prevalence of hand OA in the control group and did not state as a conclusion that there was a causal relationship between chainsaw vibrations and OA. The conclusions in the report were limited to the prevalence of vacuoles in the chainsaw users. Accordingly, I do not consider this report to support Ms. Village's statement that there is a documented relationship between exposure to chainsaw vibration and OA.

I accept that there is some epidemiological evidence of a relationship between exposure to some vibrating hand held tools and OA. For example, the 1980 study by Bovenzi et al. reported that over 20% of caulkers employed in a shipyard who used chipping hammers and grinders had radiological signs of OA in the wrist and shoulders and 31.3% had cysts in the carpal bones. The report also stated that vibrations of high amplitude and low frequency give rise to OA lesions while vibrations with a higher frequency may cause neurovascular disorders.

In another study in 1987 Bovenzi et al. reported that the prevalence of cysts in the metacarpal and carpal bones was almost the same among vibration-exposed foundry workers and the control group, but radiological signs of OA in the wrist joint were more prevalent in the foundry workers than the control group. The foundry workers in the study were exposed to vibrations from chipping and grinding tools.

In light of the discussion by Bovenzi et al. of the significance of the amplitude and frequency of the vibrations produced by the tools in their studies, I find that it would not be appropriate to draw conclusions about the effects of chainsaw vibrations from the studies of workers who used such tools as chippers, grinders and pneumatic drills. The reports do not indicate that chainsaws produce vibrations with similar properties as the vibrations produced by those tools. Accordingly, while I accept that the reports and the textbook citied Ms. Village provide epidemiological evidence of a causal relationship between OA and exposure to vibrations from some hand tools such as chippers, grinders and pneumatic drills, I do not accept that those reports provide reliable evidence of such a relationship between exposure to chainsaw vibrations and OA of the hand and wrist.

I accept that Ms. Village's report demonstrates a good understanding of the worker's work history including the extent of his exposure to chainsaw use between 1954 and 1997 as well the nature of his hand OA. However, because it is based on the scientific studies summarized above, I do not accept her opinion that the worker's exposure to chainsaw vibrations caused or contributed to the development of his OA of the hands. I find there is a lack of epidemiological information linking chainsaw vibrations directly to the development of hand and wrist OA. Moreover, Ms. Village does not include information about the amplitude and frequency of chainsaw vibrations in her ergonomic assessment of the worker, and there is insufficient evidence on which to conclude that the findings with respect to other kinds of vibrating hand tools in the studies summarized above can be applied to chainsaw vibrations.

I also reviewed the scientific reports provided by Mr. Parker. I do not find support in them for a causal relationship between OA of the hand and wrist and chainsaw vibrations.

The report by M. Bovenzi et al., "Epidemiological Survey of Shipyard Workers Exposed to Hand-Arm Vibration," is the same 1980 report cited by Ms. Village. As I have already indicated, it did not include information on chainsaw vibrations, since it dealt with caulkers employed in a shipyard who worked with pneumatic tools, including chipping hammers.

The 1987 report by M. Bovenzi et al., "Bone and Joint Disorders in the Upper Extremities of Chipping and Grinding Operators," was also cited by Ms. Village and is discussed above. Again, this study did not deal with chainsaw operators.

The 1990 article by M. Bovenzi, "Medical Aspects of the Hand-Arm Vibration Syndrome," is a literature review that does not refer to studies of workers exposed to chainsaw vibrations.

The 1983 article by J. A. Burkhart, "Musculoskeletal Diseases in Lumbar and Wood Products Workers as Identified through Hospital Records Surveillance," describes a study in which questionnaires were given to patients identified in discharge records from four hospitals in three counties in southern Oregon. The questionnaires were used to obtain information about the occupations and work histories of the discharged patients. The patients were classified according to the number of years of exposure in the lumber and wood products industries and then by years of exposure to sawmill, millwork and logging industries separately. The study found a highly statistically significant increased prevalence of hospitalization for musculoskeletal disorders, including OA, for workers in the lumber and wood products industries compared to a control group. This study is of limited assistance in the present case, however, because it did not break down the workers into specific occupations, such as tree fallers who work with chainsaws as opposed to other logging operation workers who operate other kinds of equipment. Moreover, the report does not include information on the relationship between specific tools and OA or vibrations and OA.

The 1986 A. G. Fam and A. Kolin article, "Unusual Metacarpophalangeal Osteoarthritis In A Jackhammer Operator," is concerned with a single case of a jackhammer operator treated surgically for severe atypical OA of the MCP and elbow joints. It includes no information on the effects of chainsaw vibration.

The 1987 article by G. Gemna and H. Sarasla, "Bone and Joint Pathology in Workers Using Hand-Held Vibrating Tools" reports on a literature review with regard to the radiological documentation of bone and joint pathology in the hands and arms of workers using vibrating tools. It concludes that there is evidence that work with pneumatic percussive tools (such as chipping hammers and scalers) may cause premature elbow and wrist OA, although of very low prevalence. This article does include information on chainsaw operators or chainsaw vibrations.

The 1992 study by Tzvetkov, Boev, and Baykoushev, "Vibrations Discriminant Models and Possibilities For Prognosticating Specific and Non-Specific Effects On The Organism," looked at 290 workers from various occupations in which they were exposed to intense vibration and 102 patients suffering from disease due to vibration. Discriminant models were developed that were used to predict the presence or absence of a number of diseases, including hypertension, coronary heart disease and arthritic lesions in persons exposed to vibrations. The article states that the occupations studied included miners, concrete machinery operators, crane operators, excavator operators, drivers and bulldozer operators. The article is mainly concerned with the effects of whole body vibration rather than hand arm vibration. In any event, it does not provide evidence with respect to chainsaw operators.

After reviewing the scientific studies that were provided by Mr. Parker and those cited by Ms. Village, I return to the comment by Dr. W2 about a lack of good evidence in the medical literature showing a cause and effect relationship between chainsaw vibrations and OA in the hands. His comment is not contradicted by the medical studies that have been submitted in this appeal. On the whole I find that Dr. W2's opinion in his February 5, 1998 memo to be consistent with the scientific studies submitted by Mr. Parker and referred to by Ms. Village. To the extent that they conflict, I place more weight on the opinion of Dr. W2 than those of Dr. McGraw and Ms. Village.

In her reports Dr. Sproul did not provide an analysis or refer to any medical literature to support her opinion that the worker's hand OA was caused by working with chainsaws. I also place more weight on Dr. W2's opinion than on Dr. Sproul's opinion.

I find there is insufficient evidence on which to conclude that the worker's OA of the hands is due to his employment as a chainsaw operator. I find it more likely that the OA in his hands is a naturally occurring degenerative condition.

I have also considered whether the worker's employment was of causative significance in aggravating the OA. Because OA is a degenerative process that affects a large proportion of the population, policy item #26.50 of the RSCM I, "Natural Degeneration of the Body" is relevant. This policy recognizes that disability often results from the natural aging process and that the pace of the process can be influenced by environmental circumstances and activity. This policy also provides that if a worker is suffering from a kind of bodily deterioration that affects the population at large, it is not compensable simply because of a possibility that the work may be one of the range of variables influencing the pace of that degeneration. For the resulting disability to be compensable, the evidence must establish that the work activity brought about a disability that would probably not otherwise have occurred, or that the work activity significantly advanced the development of a disability that would otherwise have probably not occurred until later.

Policy item #26.55 of the RSCM I, "Aggravation of a Disease" provides that where a worker has a pre-existing disease which is aggravated by work activities to the point where the worker is thereby disabled, and where the pre-existing disease would not have been disabling in the absence of that work activity, the Board will accept that it was the work activity that rendered the disease disabling and pay compensation. Evidence that the pre-existing disease has been significantly accelerated, activated, or advanced more quickly than would have occurred in the absence of the work activity, is considered confirmation that a compensable aggravation has resulted from the work. This policy distinguishes an aggravation from the situation where work activities have the effect of drawing to the attention of the worker the existence of the pre-existing disease without significantly affecting its course.

In light of the foregoing policies I have considered whether the exposure to chainsaw vibrations during his employment resulted in an aggravation of his OA of the hands or

whether his employment merely had the effect of drawing to the worker's attention the symptoms of the OA.

When the worker first sought medical attention in June 1997 he told Dr. Germain that the pain in his right hand had started in February 1997 but was not initially bad enough to stop him from working, but for the past few weeks he had been unable to start the chainsaw with his right hand. The report states that the worker also said that: "When he starts work in the morning, the pain is mild, but worsens as he works." At the time of the second medical report on June 26, 1997, the worker was still working but stated that the right third MCP joint was "very sore after a few hours of work." The worker continued to work, and when he saw Dr. Cavacuiti on July 7, 1997, had a mildly swollen right third MCP joint, which had not been the case when he saw Dr. Germain in the previous two visits. When the worker saw Dr. Heffernan on August 5, 1997 he was apparently no longer at work. He had gone off work and on returning to work in July his hands had flared up again. At the hearing the worker testified that before he finally stopped working in late 1997 he had stopped working and attempted to return to work twice, and both times the pain was less when he was off work and it worsened again when he returned to work. I find that the worker's account of his symptoms, in the foregoing medical reports and in his testimony, is consistent with his employment activities aggravating his OA symptoms rather than merely making him aware of the symptoms. The fact that the pain worsened over the course of a workday and when he attempted a return to work after being off supports a causal relationship between the employment activities and aggravation of the OA symptoms. This relationship is also consistent both with the worker's testimony at the hearing and his interview with Dr. McGraw.

There is no dispute in the available medical opinions about whether his employment activities aggravated the worker's OA, at least on a temporary basis. In his August 25, 1997 memo Dr. W1 stated: "Certainly, his work may have aggravated [the third MCP joint spurs] and made them more symptomatic." On February 5, 1999 Dr. W2 opined that "No matter what the cause of the worker's arthritis,…operating a chain saw will increase the symptoms of his hand arthritis on a temporary basis." Dr. W2, however, did not think that operating a chainsaw would cause any significant aggravation of the underlying pathology or disease. In his report Dr. McGraw opined that operating a chainsaw either caused, aggravated or accelerated the worker's OA.

None of the physicians who provided opinions on causation, including the two Board medical advisors, have suggested that the worker's OA would probably have become disabling around the time that it did regardless of his employment activities.

In light of the pattern of increased symptoms over the course of a workday during the period from February 1997 onward and upon attempting to return to work twice in 1997, and the medical opinions cited above, I find that in 1997 the worker's employment activities, including his exposure to chainsaw vibrations, were a significant cause of an

aggravation of his underlying OA, which caused it to become symptomatic to a disabling degree.

Because I find it to be consistent with the evidence as a whole, I accept Dr. W2's opinion that the work with chainsaws did not significantly advance or accelerate the underlying pathology or disease. I find that the worker suffered a temporary disabling aggravation or repeated temporary aggravations of his OA due to his employment as a chainsaw operator.

In assessing the evidence I have not considered the worker's nylon gloves to be a significant factor. There is no indication that they are anti-vibration gloves or anything other than ordinary work gloves. There is no evidence that such gloves would affect the course of the worker's underlying OA or the aggravation of it.

The worker's appeal is allowed in part. The OA in his hands is not due to the nature of his employment, but is more likely a natural degenerative process. However, I find that his employment activities temporarily aggravated the underlying OA, rendering it symptomatic and disabling starting in 1997. The Board will determine the extent and duration of the worker's entitlement resulting from the aggravation.

Conclusion

August 27, 1997 Decision

I vary the Board's August 27, 1997 decision in accordance with the findings and reasons set out above. The worker's appeal is allowed in part. He is entitled to compensation for the temporary aggravation of the underlying OA of his hands.

February 17, 1998 Decision

I vary the Board's February 17, 1998 decision in accordance with the findings and reasons set out above. The worker's appeal is allowed in part. He is entitled to compensation for temporary aggravation of the underlying OA of his hands.

I found both the report from Dr. McGraw and the report from Ms. Village to be useful in my consideration of the appeal. The worker's representative submitted that reimbursement should not be limited to the Board's tariff because of the unique issue in the appeal and the need for scientific evidence. I do not find Dr. McGraw's report to go beyond what is expected in a specialist's medical-legal opinion. He interviewed and examined the worker, reviewed the medical reports from the claim file, and provided an opinion in which he cited a medical text. Reimbursement of the worker for Dr. McGraw's report is subject to the Board's tariff for medical-legal opinions. Ms. Village's invoice indicates that she charged $1,050.00 for her report, including her literature review and ergonomic assessment. The worker is entitled to be reimbursed for the expense of obtaining Ms. Village's report. I make the order for reimbursement under section 7(1)(b) of the *Workers Compensation Act Appeal Regulation*.

Guy Riecken
Vice Chair

GR/cd/rb