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Joanne Machado
Coordinator, Research and Workplace Innovation Program
Workers Compensation Board of Manitoba
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Dear Ms. Machado

Please find attached the final report for the “Development of a Pre-Production MSI Checklist: Reliability, Validity and Education” project. I am pleased with the outcomes made in the project and would like to thank you for your support.

Please contact me if you have any questions.

Sincerely yours,

Andrew Dolhy, CPE
Project Co-ordinator

Development of a Pre-Production MSI Checklist: Reliability, Validity and Education

Final Report

May 31, 2019

A. Dolhy Ergonomics Inc.
Andrew Dolhy CPE

Supported from a grant by the Research and Workplace Innovation Program
of the Workers Compensation Board of Manitoba

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Executive Summary

The Workers Compensation Board of Manitoba's Research and Workplace Innovation Program awarded A. Dolhy Ergonomics Inc. funding for a project to develop and validate an ergonomic risk evaluation tool for existing manufacturing jobs as well as pre-production tasks.

Providing production personnel, health and safety committee members, engineers, safety professionals and ergonomists with an evaluation tool which can be used on existing jobs as well as tasks in the design phase or before they are implemented on the shop floor would provide them a significant advantage to identifying ergonomic issues. It is more efficient to identify and control ergonomic issues before workers are exposed to the hazards.

This report details the project objectives, the evaluation of those objectives and comments on the lessons learned and recommendations. The Appendix includes the final budget and User Guidel for the evaluation tool.

In summary,

- The project successfully developed a user friendly quantitative ergonomic risk evaluation tool.

- The Manufacturing Ergonomic Risk Evaluation Tool (MERET) was validated against 75 manufacturing tasks with excellent validity and moderate reliability.

- The MERET includes a User Guide and an Excel based program for quick and efficient assessments.

A. Dolhy Ergonomics Inc. is pleased to have the opportunity to undertake this initiative and believes that it was a highly successful endeavour.

A. Dolhy Ergonomics Inc. acknowledges the financial support of The Workers Compensation Board of Manitoba through the Research and Workplace Innovation Program in the preparation of this project. However, the content of the report and/or resource(s) is the sole responsibility of A. Dolhy Ergonomics Inc. and the views expressed in it are those of the authors.

Project Overview

This project aimed to enhance an existing pre-production ergonomic risk rating assessment tool, conduct a reliability and validity test and to place the improved assessment tool into the public domain. Motor Coach Industries developed a quick ergonomic rating tool for their supervisors and manufacturing engineers to use. It lacked validity and was limited in ergonomic scope. In general, resources available to pre-production personnel are lacking in efficiency and effectiveness. Furthermore, the culture of identifying and controlling MSIs in the province is moving towards proactive measures. This project was timely in this regard, as well as provides joint health and safety committee's with a new resource that will be easy to use, interpret and assist in their efforts to quantitatively measure ergonomic risk factors, conduct follow up monitoring and assist in the mitigating of MSI risks in their workplace.

The purpose of this project was to further develop the MCI pre-production assessment tool, measure its reliability and validity and to provide this tool to Manitoba workplaces.

Project Objectives:
The objectives of this project included:

1) Improve the MCI assessment tool to incorporate additional ergonomic risks. The goal was to incorporate a wide range of ergonomic issues found in manufacturing facilities into a user friendly assessment tool.

2) Conduct a reliability and validity study and verify the assessment tool scores. The goal was to produce a reliable and valid assessment tool. Seventy Five tasks at MCI were assessed by a certified professional ergonomist and used as a standard for low risk, moderate risk or high risk tasks.

3) Provide education to users of the assessment tool.
Users of this tool include engineers, maintenance personnel, pre-production personnel, health and safety committee members, ergonomists and those tasked with developing, workstations, equipment, tools and processes. The goal was to develop a manual to teach users on proper procedures, provide guidance and the interpretation of results. The benefits of quantitatively assessing tasks will also be provided with examples.

Project Work

Project work began with an updated work plan provided on March 20th, 2018 to reflect the start date of the project as April 1st, 2018. The new end date of this 13 month project is April 30th, 2019. A request to extend the project by one month was requested to change the MERET from an Excel based program for calculations to an Adobe form based program. The User Manual was changed to a pdf for all users to view and print successfully however, the calculations required for a drop down menu option was not possible at this time. The MERET calculations remain an Excel based program.

The project was reviewed by the health and safety committee of Motor Coach Industries on March 23rd, 2018. The facility took on a significant tooling and production change during the summer shut down. The assessment tool was used to score tasks before and after they were changed. The ergonomics committee was trained on the final version of the assessment tool in March 2019.

The development of the MERET involved several actions. A review of the risk categories and format was conducted with mechanical engineers in June 2018. An initial validity and reliability study was conducted during the period of August to September 2018. Ten mechanical engineers and supervisors were provided with 4 hours of training on ergonomic principles and how to use the assessment tool. A total of 25 tasks were assessed for reliability. These included existing tasks and the jobs that were changed over during the summer shut down. A validity study on the first 55 tasks was also conducted at this time. Minor changes were made to the evaluation tool and a final reliability and validity study was conducted in March of 2019.

The promotion of the MERET will be conducted according to the knowledge transfer plan as indicated in Objective 3 of this report. Once final approval of the User Guide and MERET software has been approved by the WCB, the dissemination of this project can occur.

Project Objective #1

Improve the MCI assessment tool to incorporate additional ergonomic risks. The goal was to incorporate a wide range of ergonomic issues found in manufacturing facilities into a user friendly assessment tool.

The MERET involves an assessment of 12 risk categories. A drop down menu allows users to pick a rating for each risk category. A number is assigned to each category and an algorithm calculates three different outcome scores. The algorithm was based on existing ergonomic evaluation methods, a long history of assessing tasks at MCI, epidemiological studies of ergonomic hazards and their risks and expert opinion. The user then identifies the task as having a low, moderate or high risk of injury. The MERET was designed to evaluate the ergonomic risk of pre-production tasks or jobs that are in the design stage. Therefore the risk categories include guidance on specific quantitative measures such as reaches, heights, weights, work timing expectations and production methods. Therefore a worker is not required to be observed in order to compete the assessment. The MERET may also be used on an existing task in which a worker is performing their duties.

Assessment # 1			
Access to Work	**Body Position**	**Motion, Speed, Static Work**	**Manipulation Force**
1.0 - front, work table	1.0 - standing	1.0 - Smooth Motion, moderate pace and regular pauses in v	0.5 - < 2lb, Light, Barely noticeable or relaxed effort
Duration of the Process	**Process Repetition**	**Vibration**	**Contact Stress**
1.5 - >8hrs	0.5 - 1-2 times	1.0 - None	1.0 - None
Pinch Grip	**Vision**	**Temperature Issues**	**Time Pressure**
1.0 - None	1.0 - None	1.0 - None	1.0 - None
Evaluation Scores			
Cumulative Score ≥15		1.8	
High Force Score ≥5		0.3	
Force and Body Positon Score ≥8		1.3	

Figure 1: Screen shot of the Excel based program for the MERET

Risk Categories

The risk categories and their individual ratings are:

Access to Work	Body
1.0 - front, work table	1.0 - standing
2.0- extended side reach	1.0 - sitting
3.0- overhead	2.0 - bending, reaching
3.0 - at floor level	3.0 - crouching, squat, knees
4.0 - underneath/ blind	4.0 - laying on back

Motion / Speed / Static Work
1.0 - Smooth Motion, moderate pace and regular pauses in work
2.0- Smooth Motion, quick pace and/or lack of variety in work
3.0 - Rapid, Jerky Motions, moderate pace and regular pauses in work
4.0 - Rapid, Jerky Motions, quick pace and/or lack of variety in work
3.0- Little Movement, hold > 30 seconds or long duration static postures

Manipulation Force
0.5 - < 2lb, Light, Barely noticeable or relaxed effort
1.0 - 2-10lbs, Somewhat Hard, Noticeable or definite effort
2.0 - 11-25lbs, Hard, Obvious effort; Unchanged expression
3.0 - 26-50lbs, Very Hard, Substantial effort; Changed expression
4.0 - >50lbs, Near Maximal, Uses shoulder or trunk for force

Duration Of Process	Process Repetition - # of times process repeats itself
1.5 - >8hrs	0.5 - 1-2 times
2.0 - 4-8hrs	1.0 - 3-10
3.0 - 1-4hrs	2.0 - 11-20
4.0 - 30min-1 hr	3.0 - 21-50
5.0 - <30min	4.0 - >50

Vibration	Contact Stress
1.0 - None	1.0 - None
1.5 - Vibration <2hours with anti-vibration PPE	2.0 - Occasional
2.0 - Vibration <2hours	3.0 - Use knee as a hammer
2.0 - Vibration >2hrs with anti-vibration PPE	3.0 - Use hand as a hammer
4.0 - Vibration > 2hrs	4.0 - Constant

Pinch Grip Tools and Objects	Vision Issues
1.0 - None	1.0 - None
1.5 - More than 2 lbs	1.2 - Shadows
2.0 - >2 lbs with poor posture	1.4 - Reflection glare
3.0 - >2 lbs, poor posture or repetitive	1.6 - Direct glare
4.0 - >2 lbs, poor posture and wrist flicking	2.0 - Cannot see

Temperature Issues	Time Pressure
1.0 - None	1.0 - None
1.5 - Cold conditions, short duration	1.2 - Occasional time pressure
1.5 - Heat conditions, short duration	2.0 - Continuous time pressure
2.0 - Temperature issues , long duration	3.0 - Lack of recovery from demands
4.0 - Extreme conditions	

The assessor may use a printed version of the Worksheet and later input data into the evaluation tool or the excel program can be used directly. In focus groups, it was better to print a hard copy of the Worksheet especially when first learning to use the MERET. The Worksheet contains detailed information regarding the 12 Risk categories, options for picking the input for each category and specific ergonomic guidelines to help the assessor make a decision.

Access to Work	
Front/ Work Table	- around waist height and within 22" reach
Extended Side Reach	- the arm is almost fully extended, reach more than 24".
Overhead	- above head height, > 68"
At Floor Level	- or below knee height, <18"
Underneath/Blind	- body is in an awkward position to see
The design of the workstation which dictates the worker's ability to perform or conduct the task.	

Figure 2: Example of the risk category 'Access to Work" and its description with guidance

Scoring

There are three evaluation scores for the MERET.

A Cumulative Score - **15 or greater**, then the task needs to be further assessed.

This involves the Access to Work, Body Position, (Motion, Speed and Static Work and Manipulation Force), (Duration of Process and Process Repetition), Vibration, Contact Stress, Pinch Grip, Vision Issues, Temperature Issues, and Time Pressure.

A High Force Score - **5 or greater**, then the task needs to be further assessed.

This involves the combined Motion, Speed and Static Work and Manipulation Force.

A Force and Body Positon Score – **8 or greater**, then the task needs to be further assessed. This involves the sum of the Motion, Speed and Static Work and Manipulation Force score and the Body Position score.

If all three scores are below threshold then the ergonomic risk in the task is low. If one score is above threshold then the ergonomic risk is moderate and if 2 or three scores are above their threshold then the task has a high ergonomic risk.

Performing the Evaluation

The MERET was set up to evaluate a task from different perspectives. The Evaluation program includes three separate calculations. This allows for flexibility in conducting an ergonomic assessment. As discussed in the Validity section of this report, viewing a task from at least two different perspectives provides the highest degree of correlating to the outcome of a full ergonomic assessment.

The first assessment method is to view the task in its whole or complete form. That is, from beginning to end with averaging forces, frequency of motions and postures over the length of the task. This is how a basic ergonomic assessment is conducted. What is missed, are poor postures or high forces for a short period of time or other risks that get diluted over the course of a shift.

The second assessment step is to focus on one ergonomic issue, a specific body area that is a concern or a sub-task that is the most concerning. For example, a task is conducted at a worktable for most of the process cycle, however a smaller percentage of time, the task is performed overhead. Assessment #2 allows the assessor to pick 'Overhead' even though it may only make up 10% of the whole task. The assessor will also adjust the repetition and duration inputs. In another example, the Manipulation Force has an average force of 20lbs over the entirety of the task. In Assessment # 2, the assessor can pick the highest Manipulation Force, say >50lbs even though is occurs rarely, and adjust the duration, repetition, body positon etc., accordingly.

A third Assessment #3 calculation allows for an additional issue to be evaluated. It can also be used to show how a potential corrective action can change the outcome. The assessor can verify hypothetically, if a solution to the problem will have a small or large effect on any of the three evaluation outcome scores. The User Manual includes two different case studies for additional guidance. Example 1: Existing Assembly Work - Hand- Arm complaints and Example 2: New Welding Task - Evaluation from Drawings.

The assessing of a task based on overall job demands as well as focusing on a specific issue makes the MERET a unique and powerful ergonomic assessment tool.

Tasks assessed and used in the validity study.

A total of 75 tasks were assessed at Motor Coach Industries, Frank Fair Industries and Carfair Composites. Of these tasks, 22 involved hand-elbow issues, 21 shoulder-neck issues, 30 back and 2 lower limb. They are also categorized into 21 manual material handling tasks, 11 overhead work, 3 office and 40 assembly-tool tasks. There were 28 tasks assessed to be within ergonomic standards and low risk, 10 were considered high risk and presented to the health and safety department for solution development and 37 rated as moderate risk. These task were chosen based on planned current or future changes, tasks with known musculoskeletal issues and tasks identified by the ergonomist to fit some of the risk categories. These included side reaching, working underneath, forces over 50 lbs, laying on the back, sitting, very high repetitions, wrist flicking, outdoor work and continuous time pressure work.

Project Objective #2

Conduct a reliability and validity study and verify the assessment tool scores. The goal was to produce a reliable and valid assessment tool. Seventy Five tasks at MCI were assessed by a certified professional ergonomist and used as a standard for safe, moderate risk or high risk tasks.

The MERET was found to have credible and excellent validity and reliability measures.

Validity

How well a tool's outcomes compare to a criterion can be broken down into different types of validity measures. In this project the Positive Predictive Value or the probability that jobs with a moderate or high risk truly has a higher risk was calculated. The Negative Predictive Value or the probability that jobs with a low risk score truly don't have a moderate or high risk, the Sensitivity (True Positive) or to the ability of the assessment tool to correctly

identify those jobs **with** a moderate or high risk and the Specificity (True Negative) or to the ability of the assessment tool to correctly identify those jobs **without** a moderate of high risk was also calculated. As a screening evaluation tool, good validity numbers are over 80% with very credible validity over 90%.

The criterion for validity will be an advanced ergonomic assessment conducted by a certified professional ergonomist. The MERET will be compared to the results of the ergonomic assessment. Comparing outcomes to future injury claims can be problematic due to uncontrolled variables in the reporting process and the length of time, years, required to gather injury data. This project assumes that an advanced ergonomic assessment will correlate to future injury claims thereby eliminating the need for a 3-5 year predictive study.

The validity study involved comparing the MERET score outcomes to the full ergonomic evaluation of the 75 tasks. For the three outcomes, Cumulative ≥15, High Force ≥5 and Force/Posture ≥8 a low risk is a task with all three scores below the threshold. A moderate risk involves 1 of the scores above the threshold and a high risk is defined as a task with 2 or 3 scores above the threshold.

Evaluating a task based on only the **Overall Task** found the MERET to have an excellent ability to score a good job as a low risk however jobs with a moderate risk scored low half the time. Therefore the screening tool will miss some bad jobs.

Table 1: Overall Task Score Validity Matrix.

	Moderate/High Risk	Low Risk	Totals	
1, 2 or 3 outcome scores >threshold	25	2	**27**	PPV = 93%
No outcomes scores > threshold	21	27	**48**	NPV = 56%
	46	**29**	**75**	
	Sensitivity = 54%	Specificity = 93%		

During the scoring process, it was noted that a task which runs over the course of a shift may have moderate to high risk activities but gets watered down in the evaluation of the whole task. Based on the ergonomist's experience, investigations into injuries usually ends up focusing on a specific sub-task or body part. For example, a heavy object lifted once or twice from floor level could be risky for back injury but an evaluation of a job over an 8-hour day would decrease its risk. Furthermore, a task at a workbench height for 90% of the day would be the main 'Access to the Work' category yet 10% of the time, overhead work occurs. Which category would the rater pick?

A second type of evaluation was performed on the 75 tasks. If the initial evaluation question changed from, "evaluate the task", to "focus on a specific body part or specific issue", then the scoring numbers changed. Table 2 shows the validity scores based on this type of analysis.

Table2: Specific Issue Score Validity Matrix.

	Moderate/High Risk	Low Risk	Totals	
1, 2 or 3 outcome scores >threshold	41	6	**47**	PPV = 87%
No outcomes scores > threshold	6	22	**28**	NPV = 79%
	47	**28**	**75**	
	Sensitivity = 87%	Specificity = 79%		

The assessment tool now has credible validity numbers for all types of predictive variables.

A third type of score evaluation involved combining the initial or overall task score with the score from the specific issue or body area. The risk definition is:

Low Risk Task - both evaluation methods score below threshold.

Moderate Risk Task – any one of the evaluation methods has at least one score above threshold would indicated a moderate or high risk.

High Risk Task – both evaluation method scores indicate a high risk task.

Table 3 shows the validity scores based on a combination of evaluation methods analysis.

Table 3: Combination Score Validity Matrix.

	Moderate/High Risk	Low Risk	Totals	
At least 1 evaluation method scores moderate or high risk.	44	7	**51**	PPV = 86%
Both evaluation methods score low	4	20	**24**	NPV = 83%
	48	**27**	**75**	
	Sensitivity = 92%	Specificity = 74%		

The assessment tool now has credible and excellent validity numbers for all types of prediction variables.

The instructions for the MERET include assessing tasks at least both ways, an overall view and an issue specific view. This will provide the best validity for identifying tasks as low risk or in need of further action.

Reliability

Reliability is a measure of consistently. The MERET was tested for inter-rater reliability. That is, the degree to which different assessors agree in their assessment of the task. The Intra-class correlation coefficient (ICC) statistical analysis was used to validate the checklists reliability. Twenty five tasks were assessed by a group of ten engineers, health and safety committee members and supervisors. Table 4, provides the ICC scores for the MERET outcomes. ICC values of 0.65 to 0.75 indicate moderate reliability, values between 0.75 and 0.9 indicate good reliability, and values greater than 0.90 indicate excellent reliability.

Table 4: Reliability of the Outcome Scores

	ICC	Comments
Cumulative ≥15	0.640	Moderate
High Force ≥5	0.672	Moderate
Force/Posture ≥8	0.661	Moderate

The reliability scores for the outcomes was moderate. A reliability analysis was completed on each of the Risk Categories, Table 5.

Table 5: Reliability of each Risk Category

	ICC	Comments
Access to Work	0.731	**Moderate**
Body Position	0.817	Good
Effort Motion	0.894	Good
Manipulation Force	0.972	Excellent
Duration of the Process	**0.538**	**Poor**
Process Repetition	**0.643**	**Moderate**
Vibration	0.983	Excellent
Contact Stress	0.956	Excellent
Pinch Grip	0.853	Good
Vision	0.943	Excellent
Temperature Issues	0.927	Excellent
Time Pressure	0.920	Excellent

The six categories that scored excellent was not a surprise. A task has vibration or it does not, there are temperature issues or there are none. A good description of force and the text to go along with the quantified measures was assumed to lead to the excellent reliability outcome of 0.972.

Access to Work had a moderate reliability due to the rater's opinion of how to handle sub-tasks. Are they a small part of the overall task or should they be chosen based on its perceived risk? For example, overhead work was chosen because of the risk potential even though front/workstation was the predominant work position for 90% of the time.

Duration of the Process and Process Repetition had lower than expected reliability results. This was after the training and a review of the

importance of choosing a duration of process and process repetition carefully. Users will need to be cognisant of rating a task as an 8-hour duration, a production standard of say 2-hour cycle time or when deciding if the same motion occurs over a certain duration as how they complete the MERET.

Project Objective #3

Provide education to users of the assessment tool.
Users of this tool include engineers, maintenance personnel, pre-production personnel, health and safety committee members, ergonomists and those tasked with developing workstations, equipment, tools and processes. The goal is to develop a guide to teach users on proper procedures, provide guidance and the interpretation of results.

User Guide

The instruction manual or user guide has been revised several times based on the initial engineer and supervisor feedback, initial reliability study and the continued improvement in risk category descriptions. The user guide includes an initial section with an introduction, how to collect information for an existing task or a pre-production task, how to perform and evaluate the MERET and additional resources. The following sections include a printable worksheet with specific risk category instructions and guidance and two case study examples for an existing task and a pre-production task. The User Guide is a pdf file which can be opened by any computer user with free adobe software.

Knowledge Transfer

The goal of the knowledge transfer plan is to make the community aware of the Manufacturing Ergonomic Risk Evaluation Tool. Table 6 represents a listing of media channels chosen to communicate with health and safety professionals, workplaces, health and safety committee members, decision makers, workers and others with an interest in ergonomics. The majority of the communication methods are brief announcements in newsletters and Internet communication, however presentations are a priority.

Table 6: Knowledge Transfer Plan

Media Channel	Comments
Workplace Safety and Health	A meeting with Workplace Safety and Health will occur on September 13th to introduce the MERET and how it may be used in Part 8 as guidance materials.
SafeWork	A meeting with SafeWork MSI specialists is scheduled for September 27th. Announcements and additional KT actions.
Made Safe – Industry Based Safety Association	A workshop is scheduled for December 4th. Training to staff and members on how to use the MERET and ergonomics will occur.
Red River College: Ergonomics course	The MERET was added to the 40 hour course curriculum, fall 2019.
MFL Occupational Health Centre Newsletter	A presentation is scheduled for September 17th. Ongoing transfer of information and use of the MERET will be through their ergonomist.
IPAM. CSSE. AIHA	Email, Newsgroups and member presentations. These groups represent most safety professionals in Manitoba. An IPAM session is scheduled for December 6
Ergonomic Leadership of Manitoba Group	A presentation will be made to ELM group – over 20 members with an ergonomic interest on September 27th.

Those interested in obtaining a copy of the MERET will be directed to the WCB web site and the A. Dolhy Ergonomics Inc. web site to

download a pdf version of the user manual and the Excel based calculation program.

Lessons Learned and Recommendations

There are five lessons learned and recommendations from this project:

1) Partnering with a workplace

Partnering with Motor Coach Industries allowed this project to succeed. In previous CIRP grants, finding a workplace to partner with after funding was approved was at times difficult. Having a signed document showing commitment should be continued with RWIP Innovation projects.

2) Budgeting for professional services

The grant recipient had the technical expertise to write the program in Excel for drop down menus and the code for calculating the final scores. Once a suggestion was made to change programs to benefit workplaces that do not have an Excel program, difficulty ensued. Finding a consultant to program the Adobe Forms was too expensive, using students such as RRC creative arts program to assist was not reliable and learning the programming was difficult in a short period of time. There was no budget for additional professional services. Grant recipients should be made aware of extra resources that maybe required as part of their application. In previous RWIP projects, extra costs for resource formatting, printing and equipment issues was also not budgeted for.

3) Future Project Work: Incorporating the MERET into safety programs.

The grant recipient will be promoting this evaluation tool to Workplace Safety and Health and the musculoskeletal consultants at Safe Work Manitoba. This tool can become a great resource for workplace's safety and health programs in the manufacturing sector. RWIP should also promote this tool within the WCB and let adjudicators and return to work managers know of its availability.

4) Future Project Work: using the MERET

Future work with the MERET may include its use in workplaces undertaking large scale production changes to help quantify economic advantages based on cost-benefit analysis.

Future work with the MERET may include developing and assessing variations, designed for other sectors such as the construction or health care sector.

Future work with the MERET may include an epidemiological prospective study linking various musculoskeletal injuries to outcome scores.

5) RWIP Promotion

The WCB should consider promoting all of its projects at Disability and Injury conferences to show the unique success the WCB of Manitoba has established with the RWIP Innovation and Education streams. Ergonomists from across North America are envious of the opportunities the RWIP provides to increase knowledge while developing practical resources for the community.

Financial Report

The accounting of project funding and expenditures to the Month of May 2019 includes:

Funding: A variance of $9,783 still owed to A. Dolhy Ergonomics Inc.

Expenditures:
Ergonomist Salary has a variance of $0.
Knowledge Transfer has a variance of $200
Stipends paid to Engineers has a variance of $17
Adobe Pro 10 – in kind A. Dolhy Ergonomics Inc. $49.97

There will be $217 left over at the completion of the project.

APPENDIX

A. Dolhy Ergonomics Inc.
Development of a Pre-Production MSI Checklist: Reliability, Validity and Education
Accounting for the Period ending May 31,2019

	Actual for the period	Actual to Date	Total Budget	Project Variance
Funding:				
WCB budget	10,000	39,100	49100	10,000
Expenditures:				
Project Co-ordinator Salary	9500	48600	48600	0
Knowledge Transfer	0	0	200	200
Stipends paid to engineering participants	283	283	300	17
Adobe Pro 10 – in kind ($49.97)				
Total Expenditures:	**9783**	**48883**	**49100**	**217**
Balance	-217	9783	0	-9783