3017 St. Clair Avenue
Suite 500
Burlington, ON
L7N 3P5

Phone: (905) 631-5600
Fax: (905) 631- 0698
meuk@meuk.net
www.meuk.net

# SR&ED Newsletter
# 2010-2: (Technological Advancement Edition)

Welcome to the second 2010 edition of our newsletter regarding recent developments to Scientific Research and Experimental Development (SR&ED) project management and tax credit claims.

**I) Facts: Recent increase in CRA challenges to "Technological Advancement" (TA).....2**

**II) Issue(s): TA has 3-5 major components – need to be specific.....2**

**III) Relevant legislation and CRA directives:.....2**

III a) Legislative definition of SR&ED.....2
III b) Tax court definition of "TA" ( 5 components).....3
III c) CRA definition of a "project".....3
III d) CRA Definition of "TA".....4
Step 1 a): Benchmark "standard practice".....4
Step 1 b): Quantified Objectives outside of "standard practice".....4
Step 2): Identify "technological uncertainty".....5
Step 3 a): Ensure "experimentation" done "systematically".....5
Step 3b): Clarifying the "technological conclusions / advancements".....6

**IV) Analysis – how to meet the CRA project & TA requirements.....7**

**COMPILING THE DATA: Template to identify and quantify the required elements:.....7**

Goal 1a): Ensure proper definition of existing knowledge at the outset:.....8
Goal 1 b): Quantification of objectives vs. standard practice.....8
Goal 2: Correlation of the research steps to specific, technical uncertainties:.....8
Goal 3a): Ensuring work was done "systematically" & costs correctly identified.....9
Goal 3b): Clarifying the "technological conclusions / advancements".....9

**V) REVIEWING THE FINAL DATA - "key criteria summary".....10**

The SR&ED "Key Criteria summary" – 5 components of TA.....10
"SR&ED key criteria" examples – plant breeding, machinery & chemistry projects:.....11

# I) Facts: Recent increase in CRA challenges to "Technological Advancement" (TA)

Recently the **CRA** has appeared to increase it's scrutiny on SR&ED claimants based on one basic challenge **claiming that they:**

## "Do not see the technological advancement."

# II) Issue(s): TA has 3-5 major components – need to be specific

In the author's opinion this is like taking your car to the mechanical and claiming, "it doesn't work right."

A (Properly trained) mechanic would likely start a conversation like;

Mechanic: "What happens when you turn the key in the ignition? Does it start?"

Client: "Sure it starts fine."

Mechanic: "Does the engine run?"

Client: "Sure it runs fine."

Mechanic: "What happens when you put the transmission in gear? Does it move?"

Client: "Sure it moves but it jerks and sometimes backfires."

Mechanic: "Okay. That will be $500 for not just telling me the problem in the first place!"

To many this situation seems almost foolish since most people would just tell the mechanic the specific problem in the first place.

Ironically when it comes to explaining "technological advancement" some CRA officials appear to provide similar lack of detail in their feedback to SR&ED claimants.

In the author's opinion a more acceptable and useful answer would be to clarify **which of the 5 major components** (illustrated below) were lacking in the clients project description.

# III) Relevant legislation and CRA directives:

## III a) Legislative definition of SR&ED

**SR&ED** is defined for income tax purposes[1], as follows:

"**scientific research and experimental development** means **systematic investigation** or search that is carried out **in a field of science or technology by** means of **experiment or analysis and** that is

(a) **basic research**, namely, work undertaken for the advancement of scientific knowledge without a specific practical application in view,

(b) **applied research**, namely, work undertaken for the advancement of scientific knowledge with a specific practical application in view, **or**

(c) **experimental development**, namely, work undertaken **for the purpose of achieving technological advancement** for the purpose of creating new, or improving existing, materials, devices, products or processes, including incremental improvements thereto,…"

## Notable quote:

**"Intellectuals solve problems; geniuses prevent them."**

**- Albert Einstein**

[1] in subsection 248(1) of the Act

## III b) Tax court definition of "TA" ( 5 components)

The Tax Court of Canada has stated;

> "The addition of these words ["**including incremental improvements thereto**" ] in 1995 applicable to taxation years ending after December 2, 1992 appears to have been in response to a concern that the achievement or attempted achievement of slight improvements was not covered.
>
> I should not have thought it was necessary to say so. **Most scientific research involves gradual, indeed infinitesimal, progress. Spectacular breakthroughs are rare and make up a very small part of the results of SR&ED in Canada."**[2]
>
> "Did the person claiming to be doing SRED formulate hypotheses specifically aimed at reducing or eliminating that technological uncertainty?
>
> This involves a **five stage process**:
>
> (a) the **observation** of the subject matter of the problem;
>
> (b) the formulation of a clear **objective**;
>
> (c) the identification and articulation of the **technological uncertainty**;
>
> (d) the formulation of an **hypothesis** or hypotheses designed to reduce or eliminate the uncertainty;
>
> (e) the methodical and **systematic testing** of the hypotheses."[3]

## III c) CRA definition of a "project"

"To establish whether or not the work you claim is eligible, we have to examine eligibility **at the project level**. You must present your claim showing your work organized as SR&ED projects."

"**An SR&ED project consists of a set of interrelated activities** that meet the **three criteria** of SR&ED defined in the current version of Information Circular 86-4, *Scientific Research and Experimental Development*. This means that the set of activities must be necessary for:

1. the attempt to achieve specific scientific or **TA** and
2. overcome scientific or **technological uncertainty,** and
3. must be pursued through a **systematic investigation** by means of experiment or analysis performed **by qualified individuals**."[4]

## Notable quote:

**"The great thing about a computer notebook is that no matter how much you stuff into it, it doesn't get bigger or heavier."**

**- Bill Gates**

[2] NORTHWEST HYDRAULIC CONSULTANTS LTD., v THE QUEEN – Tax Court of Canada - (Date: 1998/05/01 - Docket: 97-531(IT))

[3] IBID - NORTHWEST HYDRAULIC CONSULTANTS LTD., v THE QUEEN

[4] Excerpts from CRA form T4088- the Guide to completing an SR&ED claim

## III d) CRA Definition of "TA"

**The CRA provides a general definition as follows;**

"**Technological advancement** – means the generation of information or the discovery of technical knowledge that advances the understanding of the underlying technologies. Seeking a technological advancement means attempting to increase the technology base or level of the company from where it was at the beginning of the systematic investigation or search by experiment or analysis."[5]

**This is just the starting point however since the CRA then provides a list of criteria, each of which must be met, in order to meet the criteria of "technological advancement."**

**We propose to:**

- **explore the CRA published directives on "technological advancement"**
- **within the framework of the 5 components of an SR&ED project**
- **as proposed by the Tax Court of Canada in the case of Northwest Hydraulics**
- **combining these terms with**
- **the concepts envisioned in the CRA project documentation requirements as follows;**

### Step 1 a): Benchmark "standard practice"

"**Commonly available sources of knowledge** or experience are those that can reasonably be assumed to be **readily available to those with basic training** or experience in the field of concern. These resources enable them to be sufficiently qualified to participate in SR&ED. They also include knowledge that is available **in the business context of the firm**….An enterprise may **not have practical access to information proprietary to a competitor**, or known in specialist or academic circles." [6]

"Evidence of TA could include c**redible third party literature** or comparisons of the capabilities sought against those previously available from the taxpayer himself. As in a court of law, there are no rigid definitions of what constitutes credible evidence."[7]

"**Technology base or level** – is the existing state of the technology. It embodies knowledge from both of the following sources:

1) All the technological resources within the business, which include the existing level of technology, the proprietary technological "know how", and education, training and experience of the personnel.

2) All the knowledge on the technology that can be gained from **publicly and readily available sources**. Publicly and readily available sources generally include published scientific papers, industry specific publications, journals, textbooks and internet based information sources."[8]

### Step 1 b): Quantified Objectives outside of "standard practice"

Furthermore the CRA requires that the scientific or **technological objectives** you state:

- "be **quantifiable or verifiable**,
- contemplate a reasonable timeframe (generally <= 3years)" &,[9]
- "be clearly stated at an early stage in the project's evolution"[10].

"Essentially, the presence of a technological uncertainty puts the project into **the realm of experimental development** when solutions cannot be based on standard practice alone. A claim for qualifying expenditures should clearly explain all **departures from standard practice** in the experimental development activity."[11]

[5] CRA Clickable Form T661 (08) – Glossary
[6] CRA IC 86-4R3 – glossary
[7] Excerpt from, "Guidance on Eligibility of Software projects for the SR&ED tax Credits," as published by the CRA in co-operation with CATA & the software industry, September 2000.
[8] CRA Clickable Form T661 (08) - Glossary
[9] CRA form T4088, part 2, paragraph A – Guide to the T661 form.
[10] Information Circular 86-4R3, paragraph 2.10.3
[11] CRA IC 86-4R3 paragraphs 4.3 & 4.4

## Step 2): Identify "technological uncertainty"

The CRA recognizes two specific sources of eligible "technical uncertainty" for SR&ED:

"Specifically, **scientific or technological uncertainty** may occur in either of two ways:

> **[scientific uncertainty]** it may be uncertain whether the goals can be achieved at all ; **or**
>
> **[system uncertainty]** the taxpayer may be fairly confident that the goals can be achieved, but may be **uncertain which of several alternatives (i.e.**
> - **paths,**
> - **routes,**
> - **approaches,**
> - **equipment configurations,**
> - **system architectures,**
> - **circuit techniques, etc.)**
>
> will either work at all, or be feasible to meet the desired **specifications or cost targets**, or both of these…
>
> Work on **combining** standard **technologies**, devices, and/or processes is **eligible if** non-trivial combinations of established (well-known) technologies and **principles for their integration carry a major element of technological uncertainty**; this may be called a "system uncertainty."[12]

In summary, "technological obstacles/uncertainties – are the shortcomings and/or limitations of the current state of technology that prevents you from developing the new or improved capability."[13]

## Step 3 a): Ensure "experimentation" done "systematically"

Systematic investigation or search

> "A systematic investigation or search entails going from identification and articulation of the scientific or technological obstacles/uncertainties, hypothesis formulation, through testing by experimentation or analysis, to the statement of logical conclusions.
>
> In a business context, this requires that the objectives of the scientific research or experimental development work must be clearly stated at an early stage in the evolution of the project, and the method of addressing the scientific or technological obstacle/uncertainty by experimentation or analysis must be clearly set out.[14]

The CRA further requires work **to be supervised by personnel with appropriate technical backgrounds** and clarifies that in describing activities performed.

> "It **must demonstrate the presence of analysis or experiment** in the methodology you used to carry out the work. It must also include the results you obtained **and the conclusions you made.**"[15]

"The improvement of existing technologies or methodologies using well-established "routine engineering or routine development" would be ineligible if the outcome is predictable. However,…if the .. **activity is carried out in support of an eligible** experimental development project, then the activity **is eligible**."[16]

[12] CRA IC 86-4R3 paragraph 2.10.2
[13] CRA Clickable Form T661 (08) - Glossary
[14] CRA Clickable Form T661 (08) - Glossary
Form T4088 – Guide to form T661
[16] Excerpt from IC 86-4R3 paragraph 2.13

## Step 3b): Clarifying the "technological conclusions / advancements"

Components: "Achieving a **technological advance** would require removing the element of **technological uncertainty** through a process **of systematic investigation**… For an experimental development activity to be eligible the **technological advance** achieved **has only to be slight."**[17]

Conclusions: **"The search for a meaningful advance …** is satisfied whether or not the activity is successful. In other words**, determining that a hypothesis is incorrect also represents a scientific or technological advance."**[18]

Conclusions outside SP: "In the context of experimental development, scientific or **TA is the knowledge acquired in carrying out the SR&ED project**, which advances the understanding of the underlying scientific relations or technology.**"**[19]

## Notable quote:

**"What is now proved, was once only imagined."**

**- William Blake**

## Notable quote:

**"Success is on the far side of failure."**

**- Thomas Watson Sr.**

[17] Excerpt from CRA, IC 86-4R3 paragraph 2.13
[18] Excerpt from CRA, IC 86-4R3 paragraph 2.12
[19] Excerpt from IC 86-4R3 paragraph 2.13

# IV) Analysis – how to meet the CRA project & TA requirements

# COMPILING THE DATA: Template to identify and quantify the required elements:

## THE THREE COMPONENTS OF AN SR&ED PROJECT

**FORMAT:** **ITEM:**

***MAX: 350 WORDS*** **I)** **A) LIST** **State of Existing technology: Benchmarking methods & sources for citings**

***WHAT?***

| | Number of | |
|---|---|---|
| i) | _____ | Internet / Google Searches |
| ii) | _____ | Articles |
| iii) | _____ | Patent searches |
| iv) | _____ | Competitive methods |
| v) | _____ | Similar in-house technologies |
| vi) | _____ | Potential components |
| vii) | _____ | Queries to experts |
| viii) | _____ | Other |

**B) TABLE** **Performance Objective(s) (up to top 5)**

| | | *Benchmark 1* | *Benchmark 2 …* | *Benchmark 3 …* |
|---|---|---|---|---|
| i) | Existing performance | | | |
| ii) | Unit of measure | | | |
| iii) | Objective | | | |
| *iv)* | *Result (III B i)) ** | | | |

***MAX: 350 WORDS*** **II)** **LIST** **Technological Uncertainties (up to top 5 variables)**

***WHY?***

| | | |
|---|---|---|
| *i)* | _____ | *Variable 1* |
| *ii)* | _____ | *Variable 2 ….* |
| *iii)* | _____ | *Variable 3 ….* |

***MAX: 700 WORDS*** **III** **A) LIST** **Experimentation method (for EACH activity )**

***WHO, WHEN, WHERE & HOW?***

| | Number of | |
|---|---|---|
| i) | _____ | Alternatives analyzed or simulated (Theoretical) |
| ii) | _____ | Process trial runs (Physical or software) |
| iii a) | _____ | Complete prototypes (Physical or Software releases) |
| iii b) | _____ | Revisions to prototypes (in III a) |

**B i) TABLE** **Results - tie to performance objective benchmarks TABLE I B) above ***

**B ii) LIST** **Conclusions - compare Results to expectations & explain via Variables LISTED in II) above****

**B iii) LIST** **Technical documentation retained (list of 12 items per CRA T661 form)**

* + Software Industry - should clarify total lines of code: written vs. scrapped during current period

## Goal 1a): Ensure proper definition of existing knowledge at the outset:

The "advancement" section of the grid again focuses not so much on "product" advancements but on the **methods to achieve such advancements** and the fact that they have been **benchmarked against existing standard practice.**

We find that we often use this basis of "advancement" to recommend renaming of the project away from "product" descriptions and towards "methodology" objectives. As indicated above, the "advancement" section is **not** the primary focus of the grid but only a double check to insure that:

1) Standard practice "knowledge" for this industry was defined (by at least 1 benchmark), &

2) That the solution was not a "routine" implementation of this "existing" knowledge.

If these two issues are evidenced, **no matter how small the incremental improvement maybe,** the grid can then correlation of research steps to technical uncertainties.

## Goal 1 b): Quantification of objectives vs. standard practice

Whenever possible we attempt to **benchmark the quantifiable performance objectives against existing performance standards.**

## Goal 2: Correlation of the research steps to specific, technical uncertainties:

Use of these grids then allows the reviewer to scan through the projects and identify those **research steps which clearly contemplate resolving the technical uncertainties and alternatives. This is what differentiates SR&ED work from "routine engineering."**

The need for any further routine, supporting work can then be briefly mentioned but needs no further explanation. This support work will be eligible to the extent that it was "commensurate with the needs and directly in support of [the eligible research[20]]."

## Notable quote:

**"Life is trying things to see if they work."**

**- Ray Bradbury**

[20] ' Excerpt from the definition of "scientific research and experimental development" as defined in subsection 248(1) of the income Tax Act.

## Goal 3a): Ensuring work was done "systematically" & costs correctly identified

- One of the key indicators of eligibility is the ability to provide a detail of the **number of experiments performed** and alternatives analyzed.

- It also describes the **method of the work**;
  - **Analysis (least time consuming)**
  - **Process trials & /or**
  - **Prototypes (most time consuming**)

  This will support both the reasonableness of the costs claimed and the existence of, "experimentation."

- Projects can accumulate separate uncertainties each with any unlimited number of research activities. Often **portions of the "business" project do not qualify** for SR&ED (i.e. not necessary to resolve the stated uncertainties). These would be excluded from the summary since they would not correlate with the resolution of a pre-stated uncertainty.

## Notable quote:

**"In theory there is no difference between theory and practice. In practice there is."**

**- Jan van de Snepscheut**

## Goal 3b): Clarifying the "technological conclusions / advancements"

Finally, we illustrate the final stage of the process by clarifying which of the variables of "technology uncertainty" we believe to have made a **conclusion (=technological advancement)** upon**.**

## Notable quote:

**"One can show the following: given any rule, however fundamental or necessary for science, there are always circumstances when it is advisable not only to ignore the rule, but to adopt its opposite.."**

**- Paul Feyerabend**

# V) REVIEWING THE FINAL DATA - "key criteria summary"

**SR&ED "Key Criteria summary"**

| | I) Departure from "Standard | | II) Uncertainties | III) Systematic Investigation | | *DIRECT COSTS - by project & activity* | | |
|---|---|---|---|---|---|---|---|---|
| | I a) Standard Practice (SP) | I b) Objective - Quanfitied vs. Standard paractice | | III a) Research steps | III b) Conclusions | | | |
| ***Cell Format:*** | ***Number*** | ***Number*** | ***Text (5 boxes - max 25 characters each)*** | ***Number*** | ***Boolean (Y/N)*** | ***NUMBER*** | ***NUMBER*** | ***NUMBER*** |
| *Details:* | *Number of existing methods benchmarked at outset* | *Objective vs. existing performance benchmarks* | *MAIN VARIABLES: - VARIABLE 1 - VARIABLE 2 (top 5 only)* | *HOW MANY ALTERNATIVES ___ did you "analyze" to resolve the stated uncertainty? (i.e. **how many** tests, how different & why?)* | *WHICH OF THE VARIABLES OF UNCERTAINTY DID WE CONCLUDE ON THIS YEAR?* | *Manhours* | *Subcontractors* | *Materials* |
| | | | *repeat for each uncertainty* | *repeat for each activity* | *follow through each variable cited* | | | |

## The SR&ED "Key Criteria summary" – 5 components of TA

The "key Criteria summary" structure provides a simple overview of the "key variables of uncertainty" and therefore illustrate that the development work was:

a) **NOT "routine engineering"** (i.e. without any significant technological uncertainty) and instead was

b) **"systematic investigation"** into alternate solutions and their effects on other components in the system.

It then provides a full correlation of costs to assess the reasonableness.

**As a result we believe that this summary can be used by managers & claim preparers to assert that all required components of a "technological advancement" have been met.**

## Notable quote:

**"The uncreative mind can spot wrong answers, but it takes a very creative mind to spot wrong questions."**

**- Anthony Jay**

# “SR&ED key criteria” examples – plant breeding, machinery & chemistry projects:

## 703 - Agriculture - Plant breeding

**Benchmarks:** Patent searches: 2 patents
Competitive products or processes: 14 products

**Objectives:** Yield: 550 kg/acre
Lodging resistance: 8 % infection
root rot resistance: 12 % infection

**Uncertainty:** 1 - feasibility of genetic traits

**Key Variables:** determination of genes, optimal methods to transfer genes

| Activity | Testing Methods | Results - % of Objective | Variables Concluded | Hours | Materials $ | Subcontractor $ | Fiscal Year |
|---|---|---|---|---|---|---|---|
| 1 - Experimental crosses | Process trials: 10000 runs / samples | Yield: 1400 kg/acre (1800 %) | determination of genes | 517.00 | 6,075.00 | 1,405.45 | 2008 |
| 2 - Disease testing | Process trials: 400 runs / samples | Lodging resistance: 3 % infection (350 %)<br>root rot resistance: 14 % infection (0 %) | determination of genes | 1,409.66 | 1,500.00 | 2,500.00 | 2008 |
| 3 - Disease testing (cntd.) | Process trials: 400 runs / samples | root rot resistance: 11 % infection (150 %) | determination of genes<br>optimal methods to transfer genes | 350.00 | 0.00 | 0.00 | 2009 |

## 801 - Machinery - improve compounding equipment

**Benchmarks:** Internet searches: 35 sites / articles
Patent searches: 2 patents
Potential components: 14 products
Queries to experts: 2 responses

**Objectives:** Temperature variance: 3 Deg C
Output: 130 output/minute
Shear: 12 tons/sq.inch
Dispersivity: 1.0 mm

**Uncertainty:** 1 - Temperature Control

**Key Variables:** device locations, optimal measurement devices, vibrations

| Activity | Testing Methods | Results - % of Objective | Variables Concluded | Hours | Materials $ | Subcontractor $ | Fiscal Year |
|---|---|---|---|---|---|---|---|
| 1 - Thermocouples | Analysis / simulation: 19 alternatives<br>Process trials: 46 runs / samples | (none) | vibrations | 1,247.00 | 20,000.00 | 45,000.00 | 2008 |
| 2 - Fibre Optic system | Analysis / simulation: 1 alternatives<br>Process trials: 5 runs / samples | Temperature variance: 1 Deg C (150 %)<br>Output: 112 output/minute (40 %)<br>Shear: 13 tons/sq.inch (150 %)<br>Dispersivity: 0.6 mm (20 %) | device locations<br>optimal measurement devices | 975.00 | 0.00 | 10,000.00 | 2008 |

## 803 - Chemicals - Optimize DA Catalyst Recipe

**Benchmarks:** Internet searches: 33 sites / articles
Competitive products or processes: 7 products

**Objectives:** Catalyst Efficiency: 169 kgPE/gTi.h
Bulk Density: 0.45 g/cm^3
Powder Morphology: 4900 cm^2/g

**Uncertainty:** 1 - Modeling of catalyst fabrication conditions

**Key Variables:** bulk density, catalyst efficiency, metal ratio, powder morphology, zinc concentration

| Activity | Testing Methods | Results - % of Objective | Variables Concluded | Hours | Materials $ | Subcontractor $ | Fiscal Year |
|---|---|---|---|---|---|---|---|
| 1 - Catalyst test trials | Analysis / simulation: 10 alternatives<br>Process trials: 10 runs / samples | Catalyst Efficiency: 140 kgPE/gTi.h (62 %)<br>Bulk Density: 0.45 g/cm^3 (100 %) | bulk density<br>catalyst efficiency<br>powder morphology | 1,030.18 | 0.00 | 0.00 | 2008 |

## Questions or feedback

We welcome your questions or feedback on any issues raised in this letter.

We also encourage interested parties to examine:

- past SR&ED newsletters &
- our SR&ED tax guide [the Guide to R&D Base],

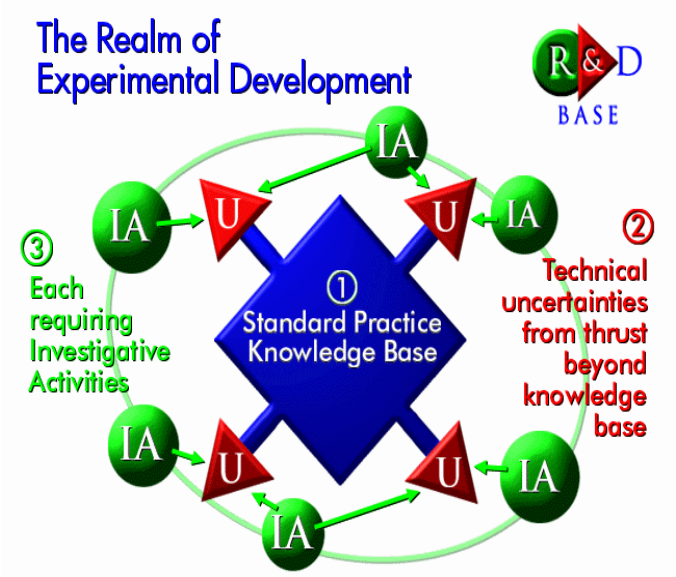
all of which are designed to simplify the SR&ED tax credit claims. These are available from our website at,

# www.meuk.net

- For an overview of our "R&D Base" software &
- additional tutorials defining eligible SR&ED activities,

please go to:

# www.rdbase.net




## Terms of use

Although we endeavor to ensure accurate and timely information throughout this letter, it is not intended to be a definitive analysis of the legislation, nor a substitute for professional advice. Before implementing decisions based on this information, readers are encouraged to seek professional advice, in order to clarify how any issues discussed herein, may relate to their specific situations.

This document may be reproduced and distributed freely as long as it acknowledges MEUK Corporation as the original author.