SR&ED INSTRUCTIONS & DESCRIPTIONS BY INDUSTRY

PROJECT OUTLINE: INSTRUCTIONS FOR ENTERING DATA

MEUK - suggested SR&ED project description structure

I i) State of Existing technology: Benchmarking methods & sources for citings — **Number of** — ***Explanatory notes / results:***

Internet / Google Searches		internet sites
Articles		articles
Patent searches		patents
Competitive methods		products / processes
Similar prior in-house technologies		products / processes
Potential components		products
Queries to experts		responses
Other		___ (specify)

ii) Objective(s)

Performance measures	Existing benchmark	Units of measure	Performance objective

II) Technological Uncertainities — ***Outline top 5 key variables***

III i) *for EACH ACTIVITY* — ***define fiscal year***

Experimentation method — **Number of** — ***Explanatory notes: justification of sample size***

i a)	Analysis / simulation	alternatives	***typically quickest method***
i b)	Process trials	runs / samples	***typically more time consuming***
i c i)	Prototypes	samples	***typically most time consuming***
I c ii)	protoype revisions	revisions	

ii a) Results - tie to performance objectives in I ii) above

ii b) Conclusions - tie to variable(s) in Uncertainties II)

iii) Documentation - tie to Activities in III i)

iv) a) Costs: labour hours by direct employees - tie to Activities in III i)
iv) b) Costs: labour $ via contractor - tie to Activities in III i)
v) Costs: materials - consumed or transformed - tie to Activities in III i)

Scientific or Technological Objectives:

Measurement	Current Performance	Objective	Has results?
A QUANTIFIABLE OBJECTIVE (#)	1	2	Yes
OBJECTIVE #2 (E.G. COST) ($/UNIT)	100	90	No

THE FIRST STEPS OF THE DOCUMENTATION PROCESS ARE TO;
- ATTEMPT TO DESCRIBE THE OVERALL THE OBJECTIVES IN FEW SENTENCES &
- QUANTIFY OBJECTIVE VS. CURRENT PERFORMANCE

QUANTIFICATION:
THE TAX COURT'S CONTINUALLY REITERATE THE FACT THAT,
"SYSTEMATIC INVESTIGATION MUST INVOLVE EXTREMELY ACCURATE MEASUREMENTS AND SUBSEQUENT ANALYSIS OF THOSE MEASUREMENTS,"

SO WE SHOULD ATTEMPT TO PROVIDE SUCH EVIDENCE WHENEVER POSSIBLE.
QUANTIFIABLE OBJECTIVES COULD INCLUDE; COST, PERFORMANCE, SIZE RESTRICTIONS, ETC.

NOTE: ONCE YOU FILE A CLAIM YOU CAN EMPOWER THE CANADA REVENUE AGENCY (CRA) REVIEWERS WITH ONLINE ACCESS TO SUPPORTING DOCUMENTS & COSTS ONLINE VIA WWW.RDBASE.NET

THIS WILL ALLOW THEM TO QUICKLY ASSESS WHAT INFORMATION MAY BE REQUIRED TO COMPLETE THE REVIEW.

SEE WHAT THE REVIEWER MIGHT SEE BY "LOGGING" IN AS:
USERNAME: CRA@RDBASEDEMO
PASSWORD: 09REVIEWER [ALL CAPITAL LETTERS]

Technology or Knowledge Base Level:

Benchmarking methods & sources for citings:
- Internet searches: 1 sites / articles -- LIST ANY RELEVENT "ARTICLES" OR REPORTS
- Patent searches: 2 patents -- NOT COMMON HOWEVER, IF DONE WE SHOULD SPECIFY SINCE STRONG EVIDENCE
- Competitive products or processes: 3 products -- IDENTIFY LIMITS + IF COMPETITORS HAVE DEVELOPED TECHNOLOGY CLARIFY "METHOD" NOT AVAILABLE TO US
- Similar prior in-house technologies: 4 products / processes -- THIS IS GREAT FOR BENCHMARKING (QUANTIFYING) EXISTING PERFORMANCE LIMITS AND PROBLEMS
- Potential components: 5 products -- OFTEN SUPPLIERS CAN TELL YOU HOW THEIR PRODUCTS MAY PERFORM & PROVIDE GUIDANCE
- Queries to experts: 6 responses -- EXPERT OPINIONS ON THE LIMITS OF TECHNOLOGY INDICATE PROJECTS ARE ELIGIBLE

ARE WE "THINKING OUTSIDE THE BOX"?

THE CRA CLARIFIES THAT;
"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...
- [HOWEVER]...AN ENTERPRISE MAY NOT HAVE
  - PRACTICAL ACCESS TO INFORMATION PROPRIETARY TO A COMPETITOR,
  - OR KNOWN IN SPECIALIST OR ACADEMIC CIRCLES." [CRA IC 86-4R3 GLOSSARY]

THE GOAL IS TO SHOW THAT;
- REASONABLE STEPS WERE TAKEN TO ENSURE THAT
- THE "METHOD" TO OBTAIN THE OBJECTIVE(S) WAS NOT "READILY AVAILABLE."

WE PROPOSE THAT THE LIST ABOVE REPRESENTS THE MOST COMMON METHODS THAT RESEARCHERS USE TO
- "BENCHMARK" EXISTING KNOWLEDGE
- BEFORE EMBARKING ON DEVELOPMENT PROJECTS.

THE RESULTS OF THIS SEARCH WILL THEN HELP TO DEFINE THE PROJECT'S TECHNOLOGICAL;
- OBJECTIVES &
- RELATED TECHNOLOGICAL UNCERTAINTIES.

Field of Science/Technology:

Mechanical engineering (2.03.01)

Project Details:

Intended Results:	Develop new processes, Develop new materials, devices, or products, Improve existing processes, Improve existing materials, devices, or products
Work locations:	Analysis, Commercial Facility
Key Employees:	Nick Tesla (Electrical technology - CET (2002) / Research Associate), Al Einstein (Physics - PhD. (1938) / Lead Researcher), Isaac Newton (Mechanical engineering - M.Asc. (1974) / Research Manager)
Evidence types:	Project planning documents; Progress reports, minutes of project meetings; Test protocols, test data, analysis of test results, conclusions; Records of resources allocated to the project, time sheets; Samples, prototypes, scrap or other artefacts; Design, system architecture and source code; Project records, laboratory notebooks; Photographs and videos; Design of experiments; Records of trial runs; Contracts

Scientific or Technological Advancement:

Uncertainty #1: Technological Uncertainty - e.g. Equipment variables
THE CRA CLARIFIES THAT;

"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." IC-86R3 PARA. 2.10.2

IDENTIFYING KEY VARIABLES:
FROM A CLAIM PERSPECTIVE WE HAVE FOUND THAT THE MOST SUCCESSFUL CLAIMS ARE THOSE THAT OUTLINE SOME FORM OF "TEST MATRIX" TO LIST THE TOP 3-5, "KEY VARIABLES OF UNCERTAINTY."

EFFECTS ON PROJECT STRUCTURE:
ONCE THE DEVELOPMENT TEAM MEMBERS AGREE ON THE;
- OBJECTIVES (SQUARE) &

- UNCERTAINTIES (TRIANGLES) EACH TEAM MEMBER CAN DOCUMENT HIS OR HER OWN
- ACTIVITIES (CIRCLES).

The most significant underlying key variables are:
VARIABLE #1 - e.g. component selection,
VARIABLE #2 - e.g. component layout,
VARIABLE #3 - e.g. controlling interference

A c t i v i t y # 1 - 1 : C h a n g e s t o t h e E q u i p m e n t (F i s c a l Y e a r 2 0 0 8)

Methods of experimentation:

- **Analysis / simulation**: 2 alternatives - **METHOD 1** - "ANALYSIS OR SIMULATION" TEND TO BE THE **"LEAST"** TIME INTENSIVE "METHODS" OF EXPERIMENTATION.
    - FOR EXAMPLE EACH ALTERNATIVE MAY TAKE 1 MAN-HOUR TO SIMULATE OR ANALYZE.

- **Process trials:** 9 runs / samples - **METHOD 2** - ACTUAL "PROCESS TRIALS" TEND TO BE A **"MODERATELY"** TIME INTENSIVE "METHOD" OF EXPERIMENTATION.
    - FOR EXAMPLE EACH ALTERNATIVE MAY NOW TAKE 10 MAN-HOURS TO TEST ON THE FACTORY FLOOR.

- **Physical prototypes**: 5 samples (with 3 revisions) - **METHOD 3** - DEVELOPMENT OF "NEW PROTOTYPES" TENDS TO BE THE "**MOST" TIME INTENSIVE "METHOD"** OF EXPERIMENTATION.
    - FOR EXAMPLE EACH PROTOTYPE ALTERNATIVE MAY NOW TAKE 1,000 MAN-HOURS TO DESIGN, FABRICATE, TEST AND REMODIFY UNTIL COMPLETE.

  PROVIDING THE CRA WITH DETAILS ON
  - THE NUMBER OF VARIATIONS CONTEMPLATED (5, 50, 500)
  - IF DIFFERENT, HOW SO AND WHY?

  WILL ALLOW THE CRA REVEIWERS TO
  - VERIFY THAT THE ANSWER WAS NOT READILY APPARENT &
  - JUDGE THE "GROSS REASONABLENESS" OF THE RELATED COSTS BEING CLAIMED.

Results:

- A QUANTIFIABLE OBJECTIVE: 1.5 # (50% of objective) -- USERS CAN TRY TO PROVIDE A BRIEF EXPLANATION ON THE "RESULTS" FOR "EACH OBJECTIVE."

  GENERALLY SPEAKING IF THERE WERE QUANTIFIABLE RESULTS WE WOULD CLARIFY WHAT WAS ACHIEVED VS. THE OBJECTIVE.

  IF THE TESTS WERE INCOMPLETE OR UNSUCCESSFUL WE COULD CLARIFY WHAT FURTHER WORK MAY BE CONTEMPLATED.

Conclusion:

THE CRA CLARIFIES THAT; "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**." [CRA IC 86-4R3 PARA 2.12]

AN IDEAL DESCRIPTION WOULD;
- PROVIDE CONCLUSIONS ON EACH OF THE STATED VARIABLES OF UNCERTAINTY &
- ATTEMPT TO EXPLAIN ANY UNEXPECTED RESULTS.

Most significant variables concluded on: VARIABLE #1 - e.g. component selection, VARIABLE #2 - e.g. component layout, VARIABLE #3 - e.g. controlling interference

Technical Documents:

- LIST &/OR UPLOAD ANY OF THE 12 EVIDENCE TYPES [LISTED IN "PROJECT DETAILS"]
- What is SR&ED brochure

SR&ED Stage 0.1 - MEUK Brochure - What is SR&ED (2 pages).pdf -- 280199 bytes

U n c e r t a i n t y # 2 : P r o c e s s

NOTE: THE TECHNOLOGICAL UNSERTAINTIES CAN BE IDENTIFIED AT THE

- PRODUCT &/OR
- PROCESS LEVEL.

The most significant underlying key variables are:

VARIABLE #1, VARIABLE #2, VARIABLE #3

Activity #2-1: Influence of moulding process parameters (Fiscal Year 2008)

Methods of experimentation:

- Analysis / simulation: 2 alternatives
- Process trials: 3 runs / samples
- Physical prototypes: 4 samples (with 5 revisions)

Results:

- A QUANTIFIABLE OBJECTIVE: 1.9 # (90% of objective) -- ADDITIONAL COMMENTS REGARDING RESULTS

Conclusion:

Most significant variables concluded on: VARIABLE #1, VARIABLE #2, VARIABLE #3

Activity #2-2: Influence of moulding process parameters - continued (Fiscal Year 2009)

Methods of experimentation:

- Analysis / simulation: 3 alternatives
- Process trials: 5 runs / samples
- Physical prototypes: 4 samples (with 2 revisions)

[THE ACTIVITY CONTINUED INTO THE NEXT FISCAL YEAR. PLEASE CONTINUE WITH DESCRIBING THE WORK PERFORMED]

Results:

- A QUANTIFIABLE OBJECTIVE: 2.1 # (110% of objective) -- ADDITIONAL COMMENTS FOR RESULTS

Conclusion:

Most significant variables concluded on: VARIABLE #1, VARIABLE #2, VARIABLE #3

Key Criteria Summary

R&D Base demo

100 - PROJECT OUTLINE: INSTRUCTIONS FOR ENTERING DATA

Benchmarks:
Internet searches: 1 sites / articles
Patent searches: 2 patents
Competitive products or processes: 3 products
Similar prior in-house technologies: 4 products /
Potential components: 5 products
Queries to experts: 6 responses

Objectives:
A QUANTIFIABLE OBJECTIVE: 2 #
OBJECTIVE #2 (E.G. COST): 90 $/UNIT

Uncertainty: 1 - Technological Uncertainty - e.g. Equipment variables

Key Variables: VARIABLE #1 - e.g. component selection, VARIABLE #2 - e.g. component layout, VARIABLE #3 - e.g. controlling interference

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Changes to the Equipment	Analysis / simulation: 2 alternatives Process trials: 9 runs / samples Physical prototypes: 5 samples ... prototype revisions: 3 revisions	A QUANTIFIABLE OBJECTIVE: 1.5 # (50 %)	VARIABLE #1 - e.g. component selection VARIABLE #2 - e.g. component layout	250.00	3,195.00	1,540.00	2008

Uncertainty: 2 - Process

Key Variables: VARIABLE #1, VARIABLE #2, VARIABLE #3

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Influence of moulding process parameters	Analysis / simulation: 2 alternatives Process trials: 3 runs / samples Physical prototypes: 4 samples ... prototype revisions: 5 revisions	A QUANTIFIABLE OBJECTIVE: 1.9 # (90 %)	VARIABLE #1 VARIABLE #2 VARIABLE #3	130.00	1,563.00	3,059.00	2008
2 - Influence of moulding process parameters - continued	Analysis / simulation: 3 alternatives Process trials: 5 runs / samples Physical prototypes: 4 samples ... prototype revisions: 2 revisions	A QUANTIFIABLE OBJECTIVE: 2.1 # (110 %)	VARIABLE #1 VARIABLE #2 VARIABLE #3	125.00	1,400.00	2,999.15	2009

Project Name: Machinery - improve compounding equipment **Start Date:** 2008-06-01
Project Number: 801 **Completion Date:** 2009-03-31

Machinery - improve compounding equipment:

801 - Machinery - improve compounding equipment

Benchmarks:
Internet searches: 33 sites / articles
Patent searches: 2 patents
Potential components: 14 products
Queries to experts: 2 responses

Objectives:
Temperature variance: 2 Deg C
Output: 120 output/minute
Shear: 12 tons/sq.inch
Improve Dispersivity: 1 mm
Maximum cost increase: 15 %

Uncertainty: 1 - Temperature Control

Key Variables: device locations, optimal measurement devices, vibration - locations and intensity

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Thermocouples	Analysis / simulation: 12 alternatives Process trials: 36 runs / samples	Temperature variance: 4 Deg C (33 %) Output: 100 output/minute (0 %) Shear: 50 tons/sq.inch (2000 %) Improve Dispersivity: 0.6 mm (20 %)	device locations optimal measurement devices	1,334.00	20,000.00	39,750.00	2008
2 - Fibre Optic system	Analysis / simulation: 6 alternatives Process trials: 90 runs / samples Physical prototypes: 1 samples ... prototype revisions: 2 revisions	Temperature variance: 1 Deg C (133 %) Output: 112 output/minute (60 %) Shear: 13 tons/sq.inch (150 %) Improve Dispersivity: 0.9 mm (80 %) Maximum cost increase: 20 % (133 %)	device locations optimal measurement devices	1,015.00	9,849.00	8,000.00	2008
3 - Fibre Optic System Optimization	(none)	(none)	(none)	1,013.00	1,280.00	1,200.00	2009

Part 2 - Project information (continued)

Complete a separate Part 2 for each project claimed this year.

Section A – Project identification

200 Project title (and identification code if applicable)

801 - improved compounding equipment

202 Project start date	**204** Completion or expected completion date	**206** Field of science or technology code (See guide for list of codes)
2008-06 (Year Month)	2009-09 (Year Month)	2.03.01 Mechanical engineering

Project history

208 1 ☐ Continuation of a previously claimed project **210** 1 ☒ First claim for the project

218 Was any of the work done jointly or in collaboration with other businesses? . . . . . 1 ☐ Yes 2 ☒ No

If you answered **yes** to line 218, complete lines 200 and 221.

220 Names of the businesses	**221** BN
1	

The work was carried out (check any that apply)

222 1 ☐ By analysis only
223 1 ☐ In a laboratory
224 1 ☐ In a dedicated research facility
226 1 ☒ In a commercial plant or facility
228 1 ☐ Others, specify **229** _____

Purpose of the work

230 1 ☒ To achieve technological advancement for the purpose of creating new or improving existing materials, devices, products or processes. (**Go to Section B** – Experimental development)

232 1 ☐ For the advancement of scientific knowledge (**Go to Section C** – Basic or applied research)

Section B – Experimental development

The technological advancement you are trying to achieve with this work will result in:

	Materials, devices, or products	Processes
The development of new	**235** 1 ☐	**236** 1 ☐
The improvement of existing	**237** 1 ☒	**238** 1 ☐

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

Scientific or Technological Objectives:
The key Performance measures as follows:

Objectives:	Existing benchmark	Units of measure	Performance objective
Temp variance:	+/- 5	Deg C	+/- 2
Output:	100	output/minute	120
Shear:	10	tons /sq. inch	12
Dispersivity:	1	mm	0.5

Most notably temperature control tolerance needed to be improved by over 100%

Technology or Knowledge Base Level:
Benchmarking methods & sources for citings:
Similar prior in-house technologies: 3 products / processes examined -
The product was an improvement to our proprietary "Gelimat" plastic molding process and related machinery

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

Internet / Google Searches: 33 sites & 18 articles reviewed - Identified issues on mix variation effects on temperature + limits of thermocouples

Patent searches: 2 patents examined - 2 method to use thermocouples for control process - neither applicable our environment

Potential components: 14 products examined - 14 proecuts from 4 different thermocouple suppliers and differences in performance

Queries to experts: 2 responses - Spoke with 2 machine designers to identify alternate control methods. Identified limits with respect to control strategies using themocouples and related alternatives.

242 What **technological** obstacles did you have to overcome to achieve those advancements? (*Maximum 35 lines*)

Uncertainty #1: Temperature control

Although mechanical development such as changes in the angles of the rotating blades and increased speed permitting timely fluxing of most plastics without any external application of heat has been explored, uncertainty remained as to practical ways to sense and control the temperature. A fraction of a second too long near the fluxing point could lead to an increase of over 50 C, and hence the potentially catastrophic degradation of plastics such as P.V.C.

The key variables in question were:

- Vibration
- Optimal measurement devices & locations

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

Activity #1-1: Thermocouples

Description of work performed in Fiscal Year 2008:

Experimentation method: Number of tests - Explanatory notes: justification of sample size

Analysis / simulation 12 alternatives - Examined 12 alternate configurations of Thermocouples & vibration techniques

Process trials 36 runs - Performed 3 runs at differing pressures for each of the 12 alternate configurations

All trials were recorded in a test matrix.

Conclusions:

Attempts at control by techniques such as by vibration and by thermocouples proved inadequate.

The result of this work provided Conclusions with respect to variables of:

Vibration & Optimal measurement locations

Activity #1-2: Fibre Optic system

Description of work performed in Fiscal Year 2008:

Experimentation method: Number of tests - Explanatory notes: justification of sample size

Analysis/simulation 1 alternative - Identified a potential system using fibre optics

Process trials 5 runs/samples - Performed 5 runs at differing pressures

Perform meas.:	Exist benchmark	- Units meas.	- Perform object.	- Result Vs. Expect
Temp variance	+/- 5	- Deg C	- +/- 2	- +/- 2 - Met
Output	100	- output/minute	- 120	- 112 - 60% met

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

Dispersivity	1	- mm	- 0.5	- 0.6	- 80% met
Shear	10	- tons /sq. inch	- 12	- 13	- > 10%

Conclusions:

This new mixing technology proved successful for the compounding of P.V.C. and other shear-sensitive and/or temperature-sensitive plastics if deployed properly [IDEALLY WE WOULD QUANTIFY THIS FURTHER] within the system.

Section C – Basic or applied research

250 Describe the **scientific** knowledge that you were trying to advance. (*Maximum 35 lines*)

252 Summarize the work performed **in the tax year**, and explain how that work contributed to the advancement of scientific knowledge. (Summarize the systematic investigation) (*Maximum 70 lines*)

Section D – Additional project information

Who prepared the responses for Section B or Section C?

253 1 [X] Employee directly involved in the project

254 Name: Issac Newton

255 1 [ ] Other employee of the company

256 Name

257 1 [ ] External consultant

258 Name

259 Firm

List three key employees directly involved in the project and indicate their qualifications.

260 Names	**261** Qualifications/experience and position title
1 Al Einstein	PhD/ Physics
2 Issac Newton	M.Asc/Mechanical Engineering
3 Nick Tesla	CET/Electrical Technology

265 Are you claiming any salary or wages for SR&ED performed outside Canada? . . . . . 1 [ ] Yes 2 [X] No

266 Are you claiming expenditures for SR&ED carried out on behalf of another party? . . . . . 1 [ ] Yes 2 [X] No

267 Are you claiming expenditures for SR&ED performed by people other than your employees? . . . . . 1 [X] Yes 2 [ ] No

If you answered **yes** to line 267, complete lines 268 and 269.

268 Names of individuals or companies	**269** Social Insurance Number or Business Number
1 ABC Motor Engineers	
2 MEUK Testing Labs	
3	

What evidence do you have to support your claim? (Check any that apply)
You do not need to submit the evidence with the claim. However, you are required to retain them in the event of a review.

270	1 ☐	Project planning documents	276	1 ☐	Progress reports, minutes of project meetings
271	1 ☒	Records of resources allocated to the project, time sheets	277	1 ☒	Test protocols, test data, analysis of test results, conclusions
272	1 ☐	Design of experiments	278	1 ☐	Photographs and videos
273	1 ☐	Project records, laboratory notebooks	279	1 ☐	Samples, prototypes, scrap or other artefacts
274	1 ☐	Design, system architecture and source code	280	1 ☐	Contracts
275	1 ☐	Records of trial runs	281	1 ☐	Others, specify 282

Section E – Project cost

Project expenditures claimed in the year:

285	Salary or wages	104,583 $
286	Materials consumed and transformed	20,000 $
287	SR&ED contracts	45,000 $
289	Overhead and other expenses (if you use the traditional method in Part 3)	$

Project Name:	Software - Data Warehouse Development	**Start Date:**	2008-06-01
Project Number:	802	**Completion Date:**	2009-12-31

Software – Database methodology development:

802 - Database methodology

Benchmarks: Internet searches: 21 sites / articles
Patent searches: 14 patents
Similar prior in-house technologies: 1 products /

Objectives: Access speed with large database: 15 s

Uncertainty: 1 - Relational Data Model Analysis - [Supporting Act.] **Key Variables:** performance

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Literature Review	Analysis / simulation: 4 alternatives	(none)	performance	502.00	123.00	12.00	2008

Uncertainty: 2 - Comm model vs. Relational Environment **Key Variables:** performance

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Data Communications Model Analysis	Process trials: 1 runs / samples	(none)	performance	12.00	12.00	17.00	2008

Uncertainty: 3 - Relational Access + Packet Access Combination **Key Variables:** performance

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Model Comparison Tests	Process trials: 7 runs / samples	(none)	performance	16.00	0.00	328.00	2008
2 - Hybrid Model Attempt	Physical prototypes: 1 samples	Access speed with large database: 10 s (133 %)	performance	0.00	0.00	0.00	2009

Part 2 - Project information (continued)

Complete a separate Part 2 for each project claimed this year.

Section A – Project identification

200 Project title (and identification code if applicable)

802 - New database method

202 Project start date	**204** Completion or expected completion date	**206** Field of science or technology code (See guide for list of codes)
2008-02 (Year Month)	2008-09 (Year Month)	1.02.03 Software (hardware developmen

Project history

208 1 ☐ Continuation of a previously claimed project **210** 1 ☒ First claim for the project

218 Was any of the work done jointly or in collaboration with other businesses? . . . . . 1 ☐ Yes 2 ☒ No

If you answered **yes** to line 218, complete lines 200 and 221.

220 Names of the businesses	**221** BN
1	

The work was carried out (check any that apply)

222 1 ☐ By analysis only
223 1 ☐ In a laboratory
224 1 ☐ In a dedicated research facility
226 1 ☒ In a commercial plant or facility
228 1 ☐ Others, specify **229**

Purpose of the work

230 1 ☒ To achieve technological advancement for the purpose of creating new or improving existing materials, devices, products or processes. (**Go to Section B** – Experimental development)

232 1 ☐ For the advancement of scientific knowledge (**Go to Section C** – Basic or applied research)

Section B – Experimental development

The technological advancement you are trying to achieve with this work will result in:

	Materials, devices, or products	Processes
The development of new	**235** 1 ☐	**236** 1 ☐
The improvement of existing	**237** 1 ☐	**238** 1 ☒

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

Scientific or Technological Objectives:
[AUTHOR'S NOTE: THIS PROJECT DESCRIPTION IS BASED ON THE CRA'S EXAMPLE OF AN
ELIGIBLE PROJECT FROM THEIR SR&ED SOFTWARE DEVELOPMENT INDUSTRY GUIDELINES:
INFORMATION CIRCULAR 97-1.]

To develop and implement a new data basing method in order to double the speed
of the database currently achieved in Version 3.5 of our "property record
management system."

Technology or Knowledge Base Level:
XYZ Co. has developed a proprietary DMS (database management system) as part
of their PRMS (property record management system) product. The DMS works well
with small data sets, but has excessive access times (>30 seconds) with large
databases (>1 gigabyte).

[AUTHOR'S NOTE: THIS EXPLANATION OF STANDARD PRACTICE SHOULD ATTEMPT TO
OUTLINE "READILY AVAILABLE INFORMATION" ON THE TOPIC CONSIDERED AND IDENTIFY
THE BOUNDARIES OF "KNOWN" AND "UNKNOWN" VARIABLES. THESE IN TURN FORM THE
BASIS OF THE "TECHNOLOGICAL UNCERTAINTIES". THIS INFORMATION IS USEFUL IN
HELPING THE AUDITOR TO EVALUATE THE COMPANY'S "TECHNICAL QUALIFICATIONS" WITH

Project Name: Plant Breeding – Cultivar improvement
3rd project started in fiscal 2007
Project Number: 703

Start Date: 2007-01-12
Completion Date: 2010-03-31

Agriculture - Plant breeding

703 - Agriculture - Plant breeding

Benchmarks:
Internet searches: 18 sites / articles
Patent searches: 2 patents
Competitive products or processes: 14 products
Similar prior in-house technologies: 23 products /

Objectives:
Yield improvement: 100 %
Lodging resistance improvement: 10 %
Maintain disease resistance: 100 %
Reduce cost: 4.5 $ per Kilo
maintain time of maturity : 45 days

Uncertainty: 1 - Trait isolation combination

Key Variables: genotypes (xx), genotypes (yy), genotypes (zz), optimal methods to transfer genes

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Experimental crosses	Process trials: 9770 runs / samples ... prototype revisions: 5 revisions	Yield improvement: 95 % (50 %) Lodging resistance improvement: 8 % (80 %) Reduce cost: 4.9 $ per Kilo (20 %) maintain time of maturity : 45 days (100 %)	genotypes (xx) genotypes (yy) genotypes (zz) optimal methods to transfer genes	615.00	6,075.00	1,405.45	2008

Uncertainty: 2 - Maintain disease resistance

Key Variables: disease resistance, yield

Activity	Testing Methods	Results - % of Objective	Variables Concluded	Hours	Materials $	Subcontractor $	Fiscal Year
1 - Disease testing	Process trials: 40 runs / samples	Lodging resistance improvement: 8 % (80 %) Maintain disease resistance: 98 % (100 %)	disease resistance yield	580.00	2,295.00	1,200.00	2009

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

RESPECT TO THE TECHNOLOGIES IN QUESTION.]

242 What **technological** obstacles did you have to overcome to achieve those advancements? (*Maximum 35 lines*)

Uncertainty #1: Relational Data Model Analysis - [Supporting Activity]
What kind of negative effects might result from using a relational data model with the DMS?

Uncertainty #2: Relational Environment Issues
How will using a data model designed for data communications in a relational environment affect performance?

Uncertainty #3: Relational Access + Packet Access Combination
How can we optimally combine relational and packet access against the same database to yield a minimum # of inefficiencies when processing tables in the DMS?

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

Activity #1-1 in Fiscal Year ending 2007-12-31: Literature Review
Description of work performed:
Conducted a literature review of relational data models. As a result we looked at 4 alternate data models.
Conclusions:
Discovered that relational data models could be inefficient when used in the DMS in some circumstances.

Activity #2-1 in Fiscal Year ending 2007-12-31: Data Communications Model Analysis
Description of work performed:
We experimented to determine if an existing data communications model could be adapted to achieve processing efficiencies, at the expense of additional storage space.
Conclusions:
Determined that a data communications model could achieve processing efficiencies.
This conclusion however uncovered a new uncertainty with respect to the optimal method to combine relational and packet access methods.

Activity #3-1 in Fiscal Year ending 2007-12-31: Model Comparison Tests
Description of work performed:
Conducted 7 comprehensive benchmark tests to compare performance between the two models.
Conclusions:
While some of the tables could be processed more efficiently if they were in packet form, others were best managed through relational techniques.

Activity #3-2 in Fiscal Year ending 2007-12-31: Hybrid Model Attempt
Description of work performed:
Experimentally employed a hybrid approach involving both relational and packet data management techniques in upgrading from PRMS 3.5 to 4.0. Created a prototype Data Model DMS with the intention of making it faster than the existing one.
Initial testing indicated that the new DMS was 75% faster than the existing DMS through use of the newly developed hybrid data access techniques.

Section C – Basic or applied research

250 Describe the **scientific** knowledge that you were trying to advance. (*Maximum 35 lines*)

252 Summarize the work performed **in the tax year**, and explain how that work contributed to the advancement of scientific knowledge. (Summarize the systematic investigation) (*Maximum 70 lines*)

Section D – Additional project information

Who prepared the responses for Section B or Section C?

253 1 [X] Employee directly involved in the project

254 Name: Nick Teslas

255 1 [ ] Other employee of the company

256 Name:

257 1 [ ] External consultant

258 Name:

259 Firm:

List three key employees directly involved in the project and indicate their qualifications.

260 Names	**261** Qualifications/experience and position title
1 Nick Tesla	CET/Electrical technology
2	
3	

265 Are you claiming any salary or wages for SR&ED performed outside Canada? . . . . . 1 [ ] Yes 2 [X] No

266 Are you claiming expenditures for SR&ED carried out on behalf of another party? . . . . . 1 [ ] Yes 2 [X] No

267 Are you claiming expenditures for SR&ED performed by people other than your employees? . . . . . 1 [ ] Yes 2 [X] No

If you answered **yes** to line 267, complete lines 268 and 269.

268 Names of individuals or companies	**269** Social Insurance Number or Business Number
1	

What evidence do you have to support your claim? (Check any that apply)
You do not need to submit the evidence with the claim. However, you are required to retain them in the event of a review.

270 1 [X] Project planning documents

271 1 [ ] Records of resources allocated to the project, time sheets

272 1 [ ] Design of experiments

273 1 [X] Project records, laboratory notebooks

274 1 [ ] Design, system architecture and source code

275 1 [ ] Records of trial runs

276 1 [X] Progress reports, minutes of project meetings

277 1 [ ] Test protocols, test data, analysis of test results, conclusions

278 1 [ ] Photographs and videos

279 1 [ ] Samples, prototypes, scrap or other artefacts

280 1 [ ] Contracts

281 1 [ ] Others, specify **282**

Section E – Project cost

Project expenditures claimed in the year:

285 Salary or wages . . . . . 100,000 $

286 Materials consumed and transformed . . . . . 5,000 $

287 SR&ED contracts . . . . . $

289 Overhead and other expenses (if you use the traditional method in Part 3) . . . . . $

Project Name: Chemicals - Optimize DA Catalyst Recipe
Project Number: 803

Start Date: 2008-08-01
Completion Date: 2009-12-31

Chemicals - Optimize DA Catalyst Recipe:

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
Reduce Bulk Density Variation: 0.02 g/cm^3
Powder Morphology: 4900 cm^2/g
Minimize cost of production: 3.7 $ per liter

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 Process trials: 10 runs / samples	Catalyst Efficiency: 140 kgPE/gTi.h (62 %) Reduce Bulk Density Variation: 0.45 g/cm^3 (-1333 %) Powder Morphology: 4900 cm^2/g (100 %) Minimize cost of production: 3.72 $ per liter (77 %)	bulk density catalyst efficiency metal ratio powder morphology zinc concentration	1,030.18	420.00	750.00	2008

Part 2 - Project information (continued)

Please see D-3.1 - D-3.3 for full Project Description

Complete a separate Part 2 for each project claimed this year.

Section A – Project identification

200 Project title (and identification code if applicable)

803 - Chemical - catalyst process improvement

202 Project start date	**204** Completion or expected completion date	**206** Field of science or technology code (See guide for list of codes)
2008-08 (Year Month)	2008-12 (Year Month)	1.04.06 Analytical chemistry

Project history

208 1 [ ] Continuation of a previously claimed project **210** 1 [X] First claim for the project

218 Was any of the work done jointly or in collaboration with other businesses? . . . . . 1 [ ] Yes 2 [X] No

If you answered **yes** to line 218, complete lines 200 and 221.

220 Names of the businesses	**221** BN
1	

The work was carried out (check any that apply)

222 1 [ ] By analysis only

223 1 [ ] In a laboratory

224 1 [ ] In a dedicated research facility

226 1 [X] In a commercial plant or facility

228 1 [ ] Others, specify **229**

Purpose of the work

230 1 [X] To achieve technological advancement for the purpose of creating new or improving existing materials, devices, products or processes. (**Go to Section B** – Experimental development)

232 1 [ ] For the advancement of scientific knowledge (**Go to Section C** – Basic or applied research)

Section B – Experimental development

The technological advancement you are trying to achieve with this work will result in:

	Materials, devices, or products	Processes
The development of new	**235** 1 [ ]	**236** 1 [ ]
The improvement of existing	**237** 1 [ ]	**238** 1 [X]

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

Scientific or Technological Objectives:
[AUTHOR'S NOTE: THIS SR&ED PROJECT IS BASED ON AN EXAMPLE DEVELOPED BY A
CHEMICALS INDUSTRY CANADA REVENUE AGENCY (CRA) JOINT COMMITTEE ENTITLED,
"CHEMICALS GUIDANCE DOCUMENT # 1 - SHOP FLOOR SR&ED" - THIS DOCUMENT IS
AVAILABLE FROM THE SECTOR-SPECIFIC GUIDES ON THE CRA WEBSITE AT
http://www.cra-arc.gc.ca/taxcredit/sred/sector-e.html]
The primary technological objective of this project is to minimize catalyst
batch-to-batch variability in order to increase the consistency of our resin.
This will be achieved through the development of a correlation between
catalyst fabrication conditions and the HDPE powder properties. For each batch
the plant catalyst is tested on the lab-scale reactor. The powder properties
(e.g. catalyst efficiency, bulk density, and powder morphology) will be
correlated to the catalyst fabrication conditions. The information will be
used to:
(a) eliminate Lab Scale Reactor testing of catalyst batches by R&D personnel;
(b) determine whether a batch is "in control" with respect to parameters of
interest; if out of control, the batch will be scrapped;
(c) predict the effect of catalyst batch on reactor operation and
powder-drying system;
(d) develop specific plans for improvements to catalyst fabrication hardware.

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

A secondary objective was to successfully deploy a fibre optics probe and commission a new lab-scale reactor. The experimental work will require the application of these sophisticated tools to develop an empirical correlation between plant catalyst preparation conditions and polymer properties. This is the first such study of its kind in the shop-floor environment.

Technology or Knowledge Base Level:
The company currently experiences catalyst batch-to-batch variability in the consistency of our resin due to unknown variables between catalyst fabrication conditions and HDPE powder properties.

242 What **technological** obstacles did you have to overcome to achieve those advancements? (*Maximum 35 lines*)

Uncertainty #1: Modelling of catalyst fabrication conditions
From a technological point of view, it was not clear which catalyst fabrication conditions
- (such as metal ratio,
- zinc concentration,
- OH/Cl ratio)
would have an impact on the powder properties of interest
- (i.e. Catalyst efficiency,
- bulk density, and
- powder morphology)
or if there would be any statistically significant correlation of value for an empirically-based mathematical model.
[NOTE: OPTIMALLY THIS DESCRIPTION SHOULD QUANTIFY THE RANGES TESTED FOR KEY VARIABLES EITHER HERE IN THE UNCERTAINTY, OR IN THE CATALYST TEST TRIALS ACTIVITY]

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

Activity #1-1 in Fiscal Year ending 2007-12-31: Catalyst test trials
Description of work performed:
1. Plant catalyst tested on the new lab scale reactor
2. Powder properties (12, 110 and bulk density) were control charted using a computer program
3. Catalyst preparation conditions (i.e. metal ratio, Zn concentration, OH/Cl ratio) were also control charted
4. A preliminary correlation was developed
5. Improvements were made to the sampling system
6. Manufacturing installed a new meter to control the alkyl halide addition
7. Lab scale reactor bulk density and powder morphology information was used to predict drying problems in the unit
[NOTE: THIS DESCRIPTION SHOULD LIST:
- THE NUMBER OF TESTS PERFORMED AND - THE RANGES OF VARIABLES TESTED.
- ALSO THE CORRELATION DERIVED SHOULD BE BRIEFLY DISCUSSED, AND
- THE IMPROVEMENTS MADE AND REASONS FOR THESE IMPROVEMENTS.]
Conclusions:
Results from this project have provided us with a better understanding of which catalyst fabrication conditions (such as metal ratio, zinc concentration, OH/Cl ratio) would have an impact on the powder properties of interest (i.e. Catalyst efficiency, bulk density, and powder morphology).
The information garnered from the various control charts was successfully used to plan the following years R&D and Manufacturing activities, e.g. new meters for catalyst raw material metering, increase frequency of side stream analysis, refinements to catalyst database, etc.
In addition, the preliminary database was used to successfully predict V100 efficiency and powder morphology, which is a significant technology advance within the company. We also learned that coarse lab scale reactor powders

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

often resulted in drying problems within the plant, based on the study which
showed correlations between various powder parameters and drying properties.
[NOTE: THE CONCLUSION COULD QUANTIFY THE FINAL RESULTS, OR STATE WHICH
VARIABLES WERE FOUND TO BE SIGNIFICANT / INSIGNIFICANT. THE CONCLUSION COULD
ALSO ELABORATE FURTHER ON THE CURRENT STATUS OF THE PROJECT, AND IF THERE ARE
PLANS FOR ANY FUTURE WORK.]

Activity #1-2 in Fiscal Year ending 2007-12-31: Other "post SR&ED" Activities:
Description of work performed:
1. Safety training conducted on new systems
2. Safe operating procedures documentation written
[NOTE: THESE ACTIVITIES ARE INELIGIBLE FOR SR&ED CREDITS PURPOSES SINCE THEIR
PERFORMANCE DOES NOT DIRECTLY ADDRESS ANY OF THE STATED "TECHNOLOGICAL
UNCERTAINTIES."]
Conclusions:
RECOMMENDATIONS ON SUPPORTING TECHNICAL DOCUMENTATION
EXAMPLES OF SUPPORTING INFORMATION THAT COULD BE AVAILABLE FOR ON SITE
EXAMINATION BY CANADA CUSTOMS AND REVENUE AGENCY INCLUDE:
o BACKGROUND LITERATURE RELATED TO A PROJECT PLAN o RECORDS OF
EXPERIMENTAL RUNS, TEST DATA AND RESULTS o PROJECT NOTE BOOKS AND/OR
QUANTITATIVE MEASUREMENT DATA o LAB BOOKS OR RECORDS o INTERNAL DESIGN
DOCUMENTS AND DRAWINGS o ANY OTHER RELEVANT DOCUMENTATION (E.G., PHOTOS)
THAT SUBSTANTIATES SR&ED WORK o PROTOTYPES OR MOCK-UPS o PILOT-SCALE
OR BENCH-SCALE EQUIPMENT USED FOR EXPERIMENTATION. o ANNOTATED SPC CHARTS
o ANNOTATED PROCESS LOGS o USED PARTS OF EQUIPMENT o SAMPLES OF
MATERIAL o SHIPPING DOCUMENTATION FOR EXPERIMENTAL PRODUCTS o EVIDENCE
FROM CUSTOMER/END USER TRIALS
THE CRA WILL CONSIDER OTHER SUPPORTING EVIDENCE, AS NECESSARY AND APPROPRIATE,
IN EVALUATING SR&ED CLAIMS.
[AUTHOR'S NOTE: FOR ADDITIONAL EXAMPLES SPECIFIC TO THE "PLASTICS" AND
"CHEMICAL" INDUSTRIES, VISIT, www.rdbase.net]

Section C – Basic or applied research

250 Describe the **scientific** knowledge that you were trying to advance. (*Maximum 35 lines*)

252 Summarize the work performed **in the tax year**, and explain how that work contributed to the advancement of scientific knowledge. (Summarize the systematic investigation) (*Maximum 70 lines*)

Section D – Additional project information

Who prepared the responses for Section B or Section C?

253	1 [X] Employee directly involved in the project	254 Name	Al Nobel	
255	1 [ ] Other employee of the company	256 Name		
257	1 [ ] External consultant	258 Name		259 Firm

List three key employees directly involved in the project and indicate their qualifications.

260 Names	261 Qualifications/experience and position title
1 Al Nobel	P.Eng/Chemical Engineering
2 Lou Pasteur	BSc./Chemistry
3 Nick Tesla	Electrical Technology

265 Are you claiming any salary or wages for SR&ED performed outside Canada? . . . . . 1 [ ] Yes 2 [X] No

266 Are you claiming expenditures for SR&ED carried out on behalf of another party? . . . . . 1 [ ] Yes 2 [X] No

267 Are you claiming expenditures for SR&ED performed by people other than your employees? . . . . . 1 [ ] Yes 2 [X] No

If you answered **yes** to line 267, complete lines 268 and 269.

268 Names of individuals or companies	269 Social Insurance Number or Business Number
1	

What evidence do you have to support your claim? (Check any that apply)
You do not need to submit the evidence with the claim. However, you are required to retain them in the event of a review.

270	1 [X] Project planning documents	276	1 [X] Progress reports, minutes of project meetings
271	1 [ ] Records of resources allocated to the project, time sheets	277	1 [ ] Test protocols, test data, analysis of test results, conclusions
272	1 [ ] Design of experiments	278	1 [ ] Photographs and videos
273	1 [ ] Project records, laboratory notebooks	279	1 [ ] Samples, prototypes, scrap or other artefacts
274	1 [ ] Design, system architecture and source code	280	1 [ ] Contracts
275	1 [ ] Records of trial runs	281	1 [ ] Others, specify 282

Section E – Project cost

Project expenditures claimed in the year:

285	Salary or wages	100,000 $
286	Materials consumed and transformed	$
287	SR&ED contracts	$
289	Overhead and other expenses (if you use the traditional method in Part 3)	$

Please see D-4.1 - D-4.2 for full Project Description

Part 2 - Project information (continued)

Complete a separate Part 2 for each project claimed this year.

Section A – Project identification

200 Project title (and identification code if applicable)

703 - Plant breeding - new cultivar

202 Project start date	**204** Completion or expected completion date	**206** Field of science or technology code (See guide for list of codes)
2007-02 (Year Month)	2008-09 (Year Month)	1.06.08 Plant sciences, botany

Project history

208 1 [X] Continuation of a previously claimed project **210** 1 [ ] First claim for the project

218 Was any of the work done jointly or in collaboration with other businesses? . . . . . 1 [ ] Yes 2 [X] No

If you answered **yes** to line 218, complete lines 200 and 221.

220 Names of the businesses	**221** BN
1	

The work was carried out (check any that apply)

222 1 [ ] By analysis only

223 1 [ ] In a laboratory

224 1 [ ] In a dedicated research facility

226 1 [X] In a commercial plant or facility

228 1 [ ] Others, specify **229**

Purpose of the work

230 1 [X] To achieve technological advancement for the purpose of creating new or improving existing materials, devices, products or processes. (**Go to Section B** – Experimental development)

232 1 [ ] For the advancement of scientific knowledge (**Go to Section C** – Basic or applied research)

Section B – Experimental development

The technological advancement you are trying to achieve with this work will result in:

	Materials, devices, or products	Processes
The development of new	**235** 1 [ ]	**236** 1 [ ]
The improvement of existing	**237** 1 [X]	**238** 1 [ ]

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

Scientific or Technological Objectives:
[AUTHOR'S NOTE: REPRODUCED FROM THE CRA PLANT BREEDING & SEED INDUSTRY SR&ED
PROGRAM GUIDANCE PAPER - AVAILABLE FROM THE SECTOR-SPECIFIC GUIDES ON THE CRA
WEBSITE AT http://www.cra-arc.gc.ca/taxcredit/sred/sector-e.html]
The objectives of this plant breeding project are to develop soybean
cultivars, for the 2600 to 3000 heat unit areas of Eastern Canada, that offer
the following improvements over existing cultivars:
- 10% improved yield over currently available cultivars
- 10% improved lodging resistance over currently available cultivars
- no sacrifice of resistance to leaf disease(s) or Phytophthora root
rot.
[AUTHOR'S NOTE: AS ILLUSTRATED ABOVE AND BELOW, IDEALLY THE TAXPAYER WOULD
ATTEMPT TO QUANTIFY STANDARD PRACTICE PERFORMANCE LEVELS & METHODS AND THEN
BENCHMARK THESE IMPROVEMENTS AGAINST THEM.]

Technology or Knowledge Base Level:
Soybeans are typically accompanied by maturity delays or increased susceptibly
to lodging and disease(s).
The scientific/technological advancement expected in this plant-breeding
project is the development of a new cultivar that embodies the genetic traits

240 What **technological** advancements were you trying to achieve? (*Maximum 35 lines*)

for higher yield and resistance to lodging in a genotypic combination that surpasses the performance features of existing cultivars without compromising disease resistance.

Our base level knowledge for this project is derived from our development of crosses and advanced lines in previous years' projects. This work provided us with desirable traits in our F3 and F6 lines, thus providing a starting point for our current research.

[AUTHOR'S NOTE: IDEALLY, THE TAXPAYER WOULD ATTEMPT TO QUANTIFY PROGRESS MADE TO DATE IN ISOLATING DESIRABLE TRAITS IN THEIR PREVIOUS GENETIC LINES.]

[AUTHOR'S NOTE: IDEALLY, THE TAXPAYER WOULD ATTEMPT TO IDENTIFY THE SPECIFIC METHODS OR VARIABLES WHICH CREATE THE PERCEIVED LIMITATIONS WITH RESPECT TO OBTAINING THE STATED OBJECTIVE(S).]

242 What **technological** obstacles did you have to overcome to achieve those advancements? (*Maximum 35 lines*)

Uncertainty #1: feasibility of genetic traits

The scientific/technological uncertainty relates to the feasibility of combining the desirable genetic traits from different germplasm sources into a superior performing cultivar out of thousands of possible segregating genotypic outcomes resulting from hundreds of crosses.

Uncertainty #2: Maintain disease resistance

Additionally, scientific uncertainty relates to the feasibility of achieving this result without sacrificing disease resistance, which is often compromised with yield improvements.

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

Activity #1-1 in Fiscal Year ending 2006-12-31: Experimental crosses

Description of work performed:

During the current taxation year (2006), the work undertaken and progress attained included:

- 120 new parental crosses were made in the nursery
- 4500 F3 lines meeting our selection criteria from previous crosses were advanced to F6 by single seed descent using winter nurseries
- 5000 F6 Lines originating from previous crosses were tested in preliminary yield trials at 2 locations and 200 were selected that met the criteria for further advancement
- 150 advanced lines from previous crosses were tested in advanced trials in 4 locations and 6 elite performers were selected for wide area testing

[AUTHOR'S NOTE: IDEALLY, WE WOULD ALSO EXPLAIN WHY ANY OF THE ABOVE DECISIONS WERE MADE.]

Conclusions:

Incremental advances were made towards some of the intended scientific objectives:

· the enhanced yield trait was more successfully transferred from (xx) genotypes than from (yy) or (zz) genotypes

· there was a negative correlation between yield and early maturity (i.e. < 2900 heat units)

[AUTHOR'S NOTE: IDEALLY, WE WOULD COMPARE RESULTS TO INITIAL EXPECTATIONS AND PROVIDE EXPLANATIONS OR "CONCLUSIONS" FOR RESULTS THAT WERE UNEXPECTED AT THE OUTSET OF THE WORK. THESE "CONCLUSIONS" ARE MORE RELEVANT TO DETERMINING SR&ED ELIGIBILITY THAN MERELY LISTING THE "RESULTS" (I.E. WHETHER THE END PRODUCT ITSELF WAS SUCCESSFUL).]

Activity #2-1 in Fiscal Year ending 2007-12-31: Disease testing

244 What work did you perform **in the tax year** to overcome those technological obstacles? (Summarize the systematic investigation) (*Maximum 70 lines*)

Description of work performed:
5 finished lines originating from previous crosses were tested in pre-commercial co-op trials at 8 locations, and tested in official public co-op registration trials. Official tests will be used to corroborate our disease, quality and performance results and select candidates for registration and commercialization.
Conclusions:
Resistance to soil borne diseases (e.g. Sclerotinia, Alternaria) was influenced more by plant stature (i.e. lodging trait) than the presence of the disease resistance gene itself due to the closer proximity of foliage to the soil in lodged specimens. As a result of this work five lines yielded at least 5% above commercial check varieties, with improved lodging and acceptable disease resistance.

[AUTHOR'S NOTE: IDEALLY, WE WOULD COMPARE RESULTS TO INITIAL EXPECTATIONS AND PROVIDE EXPLANATIONS OR CONCLUSIONS.]
RECOMMENDATIONS ON SUPPORTING TECHNICAL DOCUMENTATION
THE R&D BASE PROGRAM ALSO ALLOWS USERS TO CROSS REFERENCE SUPPORTING INFORMATION WHICH IS GENERATED OVER THE COURSE OF THE WORK.
THE TYPE OF RECORDS REQUIRED WOULD BE THOSE THAT WOULD NORMALLY BE GENERATED IN THE COURSE OF UNDERTAKING PLANT BREEDING. AS A GUIDELINE, SOME EXAMPLES OF THE KINDS OF SUPPORTING INFORMATION THAT SHOULD BE AVAILABLE FOR ON-SITE REVIEW BY THE CANADA REVENUE AGENCY (CRA) MAY INCLUDE THE FOLLOWING:
- BACKGROUND LITERATURE RELATED TO A PROJECT OBJECTIVES AND PLAN
-RECORD OF GENETIC CROSSES -NURSERY DATA BOOKS -RECORDS OF FIELD TRIALS -NOTES ON EXPERIMENTAL PROCEDURES -PROJECT NOTE BOOKS AND/OR QUANTITATIVE MEASUREMENT DATA -RESULTS OF STATISTICAL ANALYSES -ANY OTHER RELEVANT MATERIAL/INFORMATION (E.G. PHOTOS) THAT SUBSTANTIATES THE SR&ED WORK

[AUTHOR'S NOTE: FOR ADDITIONAL "AGRICULTURAL" AND "LIFE SCIENCE" EXAMPLES VISIT, www.rdbase.net]

Section C – Basic or applied research

250 Describe the **scientific** knowledge that you were trying to advance. (*Maximum 35 lines*)

252 Summarize the work performed **in the tax year**, and explain how that work contributed to the advancement of scientific knowledge. (Summarize the systematic investigation) (*Maximum 70 lines*)

Section D – Additional project information

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253	1 [X] Employee directly involved in the project	254 Name	
255	1 [ ] Other employee of the company	256 Name	
257	1 [ ] External consultant	258 Name	259 Firm

List three key employees directly involved in the project and indicate their qualifications.

260 Names	261 Qualifications/experience and position title
1 Al Nobel	P.Eng/Chmical Engineering
2 Al Einstein	PhD./Physics
3 Nick Tesla	CET/Electrical technology

265	Are you claiming any salary or wages for SR&ED performed outside Canada?	1 [ ] Yes	2 [X] No
266	Are you claiming expenditures for SR&ED carried out on behalf of another party?	1 [ ] Yes	2 [X] No
267	Are you claiming expenditures for SR&ED performed by people other than your employees?	1 [ ] Yes	2 [X] No

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274	1 [ ] Design, system architecture and source code	280	1 [ ] Contracts
275	1 [ ] Records of trial runs	281	1 [ ] Others, specify 282

Section E – Project cost

Project expenditures claimed in the year:

285	Salary or wages	95,417 $
286	Materials consumed and transformed	$
287	SR&ED contracts	$
289	Overhead and other expenses (if you use the traditional method in Part 3)	$