

year, incurs qualified research expenses in 2001. X wants to compute its research credit under section 41 for the tax year ending December 31, 2001. As part of the computation, X must determine its fixed-base percentage, which depends in part on X's qualified research expenses incurred during the fixed-base period, the taxable years beginning after December 31, 1983, and before January 1, 1989.

(ii) During the fixed-base period, X reported the following amounts as qualified research expenses on its Form 6765:

1984	\$100x
1985	120x
1986	150x
1987	180x
1988	170x
Total	720x

(iii) For the taxable years ending December 31, 1984, and December 31, 1985, X based the amounts reported as qualified research expenses on the definition of qualified research in effect for those taxable years. The definition of qualified research changed for taxable years beginning after December 31, 1985. If X used the definition of qualified research applicable to its taxable year ending December 31, 2001, the credit year, its qualified research expenses for the taxable years ending December 31, 1984, and December 31, 1985, would be reduced to \$ 80x and \$ 100x, respectively. Under the consistency rule in section 41(c)(5) and paragraph (d)(1) of this section, to compute the research credit for the tax year ending December 31, 2001, X must reduce its qualified research expenses for 1984 and 1985 to reflect the change in the definition of qualified research for taxable years beginning after December 31, 1985. Thus, X's total qualified research expenses for the fixed-base period (1984-1988) to be used in computing the fixed-base percentage is \$80 + 100 + 150 + 180 + 170 = \$680x.

Example 2. The facts are the same as in *Example 1*, except that, in computing its qualified research expenses for the taxable year ending December 31, 2001, X claimed that a certain type of expenditure incurred in 2001 was a qualified research expense. X's claim reflected a change in X's position, because X had not previously claimed that similar expenditures were qualified research expenses. The consistency rule requires X to adjust its qualified research expenses in computing the fixed-base percentage to include any similar expenditures not treated as qualified research expenses during the fixed-base period, regardless of whether the period for filing a claim for credit or refund has expired for any year taken into account in computing the fixed-base percentage.

(e) *Effective date.* The rules in paragraphs (c) and (d) of this section are ap-

plicable for taxable years beginning on or after the date final regulations are published in the FEDERAL REGISTER.

[T.D. 8930, 66 FR 289, Jan. 3, 2001]

§ 1.41-4 Qualified research for expenditures paid or incurred in taxable years ending on or after December 31, 2003.

(a) *Qualified research*—(1) *General rule.* Research activities related to the development or improvement of a business component constitute qualified research only if the research activities meet all of the requirements of section 41(d)(1) and this section, and are not otherwise excluded under section 41(d)(3)(B) or (d)(4), or this section.

(2) *Requirements of section 41(d)(1).* Research constitutes qualified research only if it is research—

(i) With respect to which expenditures may be treated as expenses under section 174, see § 1.174-2;

(ii) That is undertaken for the purpose of discovering information that is technological in nature, and the application of which is intended to be useful in the development of a new or improved business component of the taxpayer; and

(iii) Substantially all of the activities of which constitute elements of a process of experimentation that relates to a qualified purpose.

(3) *Undertaken for the purpose of discovering information*—(i) *In general.* For purposes of section 41(d) and this section, research must be undertaken for the purpose of discovering information that is technological in nature. Research is undertaken for the purpose of discovering information if it is intended to eliminate uncertainty concerning the development or improvement of a business component. Uncertainty exists if the information available to the taxpayer does not establish the capability or method for developing or improving the business component, or the appropriate design of the business component.

(ii) *Application of the discovering information requirement.* A determination that research is undertaken for the purpose of discovering information that is technological in nature does not require the taxpayer be seeking to obtain information that exceeds, expands

or refines the common knowledge of skilled professionals in the particular field of science or engineering in which the taxpayer is performing the research. In addition, a determination that research is undertaken for the purpose of discovering information that is technological in nature does not require that the taxpayer succeed in developing a new or improved business component.

(iii) *Patent safe harbor.* For purposes of section 41(d) and paragraph (a)(3)(i) of this section, the issuance of a patent by the Patent and Trademark Office under the provisions of 35 U.S.C. 151 (other than a patent for design issued under the provisions of 35 U.S.C. 171) is conclusive evidence that a taxpayer has discovered information that is technological in nature that is intended to eliminate uncertainty concerning the development or improvement of a business component. However, the issuance of such a patent is not a precondition for credit availability.

(4) *Technological in nature.* For purposes of section 41(d) and this section, information is technological in nature if the process of experimentation used to discover such information fundamentally relies on principles of the physical or biological sciences, engineering, or computer science. A taxpayer may employ existing technologies and may rely on existing principles of the physical or biological sciences, engineering, or computer science to satisfy this requirement.

(5) *Process of experimentation—(i) In general.* For purposes of section 41(d) and this section, a process of experimentation is a process designed to evaluate one or more alternatives to achieve a result where the capability or the method of achieving that result, or the appropriate design of that result, is uncertain as of the beginning of the taxpayer's research activities. A process of experimentation must fundamentally rely on the principles of the physical or biological sciences, engineering, or computer science and involves the identification of uncertainty concerning the development or improvement of a business component, the identification of one or more alternatives intended to eliminate that un-

certainty, and the identification and the conduct of a process of evaluating the alternatives (through, for example, modeling, simulation, or a systematic trial and error methodology). A process of experimentation must be an evaluative process and generally should be capable of evaluating more than one alternative. A taxpayer may undertake a process of experimentation if there is no uncertainty concerning the taxpayer's capability or method of achieving the desired result so long as the appropriate design of the desired result is uncertain as of the beginning of the taxpayer's research activities. Uncertainty concerning the development or improvement of the business component (e.g., its appropriate design) does not establish that all activities undertaken to achieve that new or improved business component constitute a process of experimentation.

(ii) *Qualified purpose.* For purposes of section 41(d) and this section, a process of experimentation is undertaken for a qualified purpose if it relates to a new or improved function, performance, reliability or quality of the business component. Research will not be treated as conducted for a qualified purpose if it relates to style, taste, cosmetic, or seasonal design factors.

(6) *Substantially all requirement.* In order for activities to constitute qualified research under section 41(d)(1), substantially all of the activities must constitute elements of a process of experimentation that relates to a qualified purpose. The substantially all requirement of section 41(d)(1)(C) and paragraph (a)(2)(iii) of this section is satisfied only if 80 percent or more of a taxpayer's research activities, measured on a cost or other consistently applied reasonable basis (and without regard to section 1.41-2(d)(2)), constitute elements of a process of experimentation for a purpose described in section 41(d)(3). Accordingly, if 80 percent (or more) of a taxpayer's research activities with respect to a business component constitute elements of a process of experimentation for a purpose described in section 41(d)(3), the substantially all requirement is satisfied even if the remaining 20 percent (or less) of a taxpayer's research activities with respect to the business component do

not constitute elements of a process of experimentation for a purpose described in section 41(d)(3), so long as these remaining research activities satisfy the requirements of section 41(d)(1)(A) and are not otherwise excluded under section 41(d)(4). The substantially all requirement is applied separately to each business component.

(7) *Use of computers and information technology.* The employment of computers or information technology, or the reliance on principles of computer science or information technology to store, collect, manipulate, translate, disseminate, produce, distribute, or process data or information, and similar uses of computers and information technology does not itself establish that qualified research has been undertaken.

(8) *Illustrations.* The following examples illustrate the application of paragraph (a)(5) of this section:

Example 1. (i) *Facts.* X is engaged in the business of developing and manufacturing widgets. X wants to change the color of its blue widget to green. X obtains from various suppliers several different shades of green paint. X paints several sample widgets, and surveys X's customers to determine which shade of green X's customers prefer.

(ii) *Conclusion.* X's activities to change the color of its blue widget to green are not qualified research under section 41(d)(1) and paragraph (a)(5) of this section because substantially all of X's activities are not undertaken for a qualified purpose. All of X's research activities are related to style, taste, cosmetic, or seasonal design factors.

Example 2. (i) *Facts.* The facts are the same as in *Example 1*, except that X chooses one of the green paints. X obtains samples of the green paint from a supplier and determines that X must modify its painting process to accommodate the green paint because the green paint has different characteristics from other paints X has used. X obtains detailed data on the green paint from X's paint supplier. X also consults with the manufacturer of X's paint spraying machines. The manufacturer informs X that X must acquire a new nozzle that operates with the green paint X wants to use. X tests the nozzles to ensure that they work as specified by the manufacturer of the paint spraying machines.

(ii) *Conclusion.* X's activities to modify its painting process are a separate business component under section 41(d)(2)(A). X's activities to modify its painting process to change the color of its blue widget to green are not qualified research under section

41(d)(1) and paragraph (a)(5) of this section. X did not conduct a process of evaluating alternatives in order to eliminate uncertainty regarding the modification of its painting process. Rather, the manufacturer of the paint machines eliminated X's uncertainty regarding the modification of its painting process. X's activities to test the nozzles to determine if the nozzles work as specified by the manufacturer of the paint spraying machines are in the nature of routine or ordinary testing or inspection for quality control.

Example 3. (i) *Facts.* X is engaged in the business of manufacturing food products and currently manufactures a large-shred version of a product. X seeks to modify its current production line to permit it to manufacture both a large-shred version and a fine-shred version of one of its food products. A smaller, thinner shredding blade capable of producing a fine-shred version of the food product, however, is not commercially available. Thus, X must develop a new shredding blade that can be fitted onto its current production line. X is uncertain concerning the design of the new shredding blade, because the material used in its existing blade breaks when machined into smaller, thinner blades. X engages in a systematic trial and error process of analyzing various blade designs and materials to determine whether the new shredding blade must be constructed of a different material from that of its existing shredding blade and, if so, what material will best meet X's functional requirements.

(ii) *Conclusion.* X's activities to modify its current production line by developing the new shredding blade meet the requirements of qualified research as set forth in paragraph (a)(2) of this section. Substantially all of X's activities constitute elements of a process of experimentation because X evaluated alternatives to achieve a result where the method of achieving that result, and the appropriate design of that result, were uncertain as of the beginning of the taxpayer's research activities. X identified uncertainties related to the development of a business component, and identified alternatives intended to eliminate these uncertainties. Furthermore, X's process of evaluating identified alternatives was technological in nature, and was undertaken to eliminate the uncertainties.

Example 4. (i) *Facts.* X is in the business of designing, developing and manufacturing automobiles. In response to government-mandated fuel economy requirements, X seeks to update its current model vehicle and undertakes to improve aerodynamics by lowering the hood of its current model vehicle. X determines, however, that lowering the hood changes the air flow under the hood, which changes the rate at which air enters the engine through the air intake system, and which reduces the functionality of

the cooling system. X's engineers are uncertain how to design a lower hood to obtain the increased fuel economy, while maintaining the necessary air flow under the hood. X designs, models, simulates, tests, refines, and re-tests several alternative designs for the hood and associated proposed modifications to both the air intake system and cooling system. This process enables X to eliminate the uncertainties related to the integrated design of the hood, air intake system, and cooling system, and such activities constitute eighty-five percent of X's total activities to update its current model vehicle. X then engages in additional activities that do not involve a process of evaluating alternatives in order to eliminate uncertainties. The additional activities constitute only fifteen percent of X's total activities to update its current model vehicle.

(ii) *Conclusion.* In general, if eighty percent or more of a taxpayer's research activities measured on a cost or other consistently applied reasonable basis constitute elements of a process of experimentation for a qualified purpose under section 41(d)(3)(A) and paragraph (a)(5)(ii) of this section, then the substantially all requirement of section 41(d)(1)(C) and paragraph (a)(2)(iii) of this section is satisfied. Substantially all of X's activities constitute elements of a process of experimentation because X evaluated alternatives to achieve a result where the method of achieving that result, and the appropriate design of that result, were uncertain as of the beginning of X's research activities. X identified uncertainties related to the improvement of a business component and identified alternatives intended to eliminate these uncertainties. Furthermore, X's process of evaluating the identified alternatives was technological in nature and was undertaken to eliminate the uncertainties. Because substantially all (in this example, eighty-five percent) of X's activities to update its current model vehicle constitute elements of a process of experimentation for a qualified purpose described in section 41(d)(3)(A), all of X's activities to update its current model vehicle meet the requirements of qualified research as set forth in paragraph (a)(2) of this section, provided that X's remaining activities (in this example, fifteen percent of X's total activities) satisfy the requirements of section 41(d)(1)(A) and are not otherwise excluded under section 41(d)(4).

(b) *Application of requirements for qualified research—(1) In general.* The requirements for qualified research in section 41(d)(1) and paragraph (a) of this section, must be applied separately to each business component, as defined in section 41(d)(2)(B). In cases involving development of both a product and a manufacturing or other com-

mercial production process for the product, research activities relating to development of the process are not qualified research unless the requirements of section 41(d) and this section are met for the research activities relating to the process without taking into account the research activities relating to development of the product. Similarly, research activities relating to development of the product are not qualified research unless the requirements of section 41(d) and this section are met for the research activities relating to the product without taking into account the research activities relating to development of the manufacturing or other commercial production process.

(2) *Shrinking-back rule.* The requirements of section 41(d) and paragraph (a) of this section are to be applied first at the level of the discrete business component, that is, the product, process, computer software, technique, formula, or invention to be held for sale, lease, or license, or used by the taxpayer in a trade or business of the taxpayer. If these requirements are not met at that level, then they apply at the most significant subset of elements of the product, process, computer software, technique, formula, or invention to be held for sale, lease, or license. This shrinking back of the product is to continue until either a subset of elements of the product that satisfies the requirements is reached, or the most basic element of the product is reached and such element fails to satisfy the test. This shrinking-back rule is applied only if a taxpayer does not satisfy the requirements of section 41(d)(1) and paragraph (a)(2) of this section with respect to the overall business component. The shrinking-back rule is not itself applied as a reason to exclude research activities from credit eligibility.

(3) *Illustration.* The following example illustrates the application of this paragraph (b):

Example. X, a motorcycle engine builder, develops a new carburetor for use in a motorcycle engine. X also modifies an existing engine design for use with the new carburetor. Under the shrinking-back rule, the requirements of section 41(d)(1) and paragraph (a) of this section are applied first to the engine. If the modifications to the engine when viewed

as a whole, including the development of the new carburetor, do not satisfy the requirements of section 41(d)(1) and paragraph (a) of this section, those requirements are applied to the next most significant subset of elements of the business component. Assuming that the next most significant subset of elements of the engine is the carburetor, the research activities in developing the new carburetor may constitute qualified research within the meaning of section 41(d)(1) and paragraph (a) of this section.

(c) *Excluded activities*—(1) *In general.* Qualified research does not include any activity described in section 41(d)(4) and paragraph (c) of this section.

(2) *Research after commercial production*—(i) *In general.* Activities conducted after the beginning of commercial production of a business component are not qualified research. Activities are conducted after the beginning of commercial production of a business component if such activities are conducted after the component is developed to the point where it is ready for commercial sale or use, or meets the basic functional and economic requirements of the taxpayer for the component's sale or use.

(ii) *Certain additional activities related to the business component.* The following activities are deemed to occur after the beginning of commercial production of a business component—

- (A) Preproduction planning for a finished business component;
- (B) Tooling-up for production;
- (C) Trial production runs;
- (D) Trouble shooting involving detecting faults in production equipment or processes;
- (E) Accumulating data relating to production processes; and
- (F) Debugging flaws in a business component.

(iii) *Activities related to production process or technique.* In cases involving development of both a product and a manufacturing or other commercial production process for the product, the exclusion described in section 41(d)(4)(A) and paragraphs (c)(2)(i) and (ii) of this section applies separately for the activities relating to the development of the product and the activities relating to the development of the process. For example, even after a product meets the taxpayer's basic functional and economic requirements,

activities relating to the development of the manufacturing process still may constitute qualified research, provided that the development of the process itself separately satisfies the requirements of section 41(d) and this section, and the activities are conducted before the process meets the taxpayer's basic functional and economic requirements or is ready for commercial use.

(iv) *Clinical testing.* Clinical testing of a pharmaceutical product prior to its commercial production in the United States is not treated as occurring after the beginning of commercial production even if the product is commercially available in other countries. Additional clinical testing of a pharmaceutical product after a product has been approved for a specific therapeutic use by the Food and Drug Administration and is ready for commercial production and sale is not treated as occurring after the beginning of commercial production if such clinical testing is undertaken to establish new functional uses, characteristics, indications, combinations, dosages, or delivery forms for the product. A functional use, characteristic, indication, combination, dosage, or delivery form shall be considered new only if such functional use, characteristic, indication, combination, dosage, or delivery form must be approved by the Food and Drug Administration.

(3) *Adaptation of existing business components.* Activities relating to adapting an existing business component to a particular customer's requirement or need are not qualified research. This exclusion does not apply merely because a business component is intended for a specific customer.

(4) *Duplication of existing business component.* Activities relating to reproducing an existing business component (in whole or in part) from a physical examination of the business component itself or from plans, blueprints, detailed specifications, or publicly available information about the business component are not qualified research. This exclusion does not apply merely because the taxpayer examines an existing business component in the course of developing its own business component.

(5) *Surveys, studies, research relating to management functions, etc.* Qualified research does not include activities relating to—

- (i) Efficiency surveys;
- (ii) Management functions or techniques, including such items as preparation of financial data and analysis, development of employee training programs and management organization plans, and management-based changes in production processes (such as rearranging work stations on an assembly line);
- (iii) Market research, testing, or development (including advertising or promotions);
- (iv) Routine data collections; or
- (v) Routine or ordinary testing or inspections for quality control.

(6) *Internal use software for taxable years beginning on or after December 31, 1985.* [Reserved].

(7) *Activities outside the United States, Puerto Rico, and other possessions—(i) In general.* Research conducted outside the United States, as defined in section 7701(a)(9), the Commonwealth of Puerto Rico and other possessions of the United States does not constitute qualified research.

(ii) *Apportionment of in-house research expenses.* In-house research expenses paid or incurred for qualified services performed both in the United States, the Commonwealth of Puerto Rico and other possessions of the United States and outside the United States, the Commonwealth of Puerto Rico and other possessions of the United States must be apportioned between the services performed in the United States, the Commonwealth of Puerto Rico and other possessions of the United States and the services performed outside the United States, the Commonwealth of Puerto Rico and other possessions of the United States. Only those in-house research expenses apportioned to the services performed within the United States, the Commonwealth of Puerto Rico and other possessions of the United States are eligible to be treated as qualified research expenses, unless the in-house research expenses are wages and the 80 percent rule of § 1.41-2(d)(2) applies.

(iii) *Apportionment of contract research expenses.* If contract research is per-

formed partly in the United States, the Commonwealth of Puerto Rico and other possessions of the United States and partly outside the United States, the Commonwealth of Puerto Rico and other possessions of the United States, only 65 percent (or 75 percent in the case of amounts paid to qualified research consortia) of the portion of the contract amount that is attributable to the research activity performed in the United States, the Commonwealth of Puerto Rico and other possessions of the United States may qualify as a contract research expense (even if 80 percent or more of the contract amount is for research performed in the United States, the Commonwealth of Puerto Rico and other possessions of the United States).

(8) *Research in the social sciences, etc.* Qualified research does not include research in the social sciences (including economics, business management, and behavioral sciences), arts, or humanities.

(9) *Research funded by any grant, contract, or otherwise.* Qualified research does not include any research to the extent funded by any grant, contract, or otherwise by another person (or governmental entity). To determine the extent to which research is so funded, § 1.41-4A(d) applies.

(10) *Illustrations.* The following examples illustrate provisions contained in paragraphs (c)(1) through (9) (excepting paragraphs (c)(6) of this section) of this section. No inference should be drawn from these examples concerning the application of section 41(d)(1) and paragraph (a) of this section to these facts. The examples are as follows:

Example 1. (i) Facts. X, a tire manufacturer, develops a new material to use in its tires. X conducts research to determine the changes that will be necessary for X to modify its existing manufacturing processes to manufacture the new tire. X determines that the new tire material retains heat for a longer period of time than the materials X currently uses for tires, and, as a result, the new tire material adheres to the manufacturing equipment during tread cooling. X evaluates several alternatives for processing the treads at cooler temperatures to address this problem, including a new type of belt for its manufacturing equipment to be used in tread cooling. Such a belt is not commercially available. Because X is uncertain of the belt design, X

develops and conducts sophisticated engineering tests on several alternative designs for a new type of belt to be used in tread cooling until X successfully achieves a design that meets X's requirements. X then manufactures a set of belts for its production equipment, installs the belts, and tests the belts to make sure they were manufactured correctly.

(i) *Conclusion.* X's research with respect to the design of the new belts to be used in its manufacturing of the new tire may be qualified research under section 41(d)(1) and paragraph (a) of this section. However, X's expenses to implement the new belts, including the costs to manufacture, install, and test the belts were incurred after the belts met the taxpayer's functional and economic requirements and are excluded as research after commercial production under section 41(d)(4)(A) and paragraph (c)(2) of this section.

Example 2. (i) *Facts.* For several years, X has manufactured and sold a particular kind of widget. X initiates a new research project to develop a new or improved widget.

(ii) *Conclusion.* X's activities to develop a new or improved widget are not excluded from the definition of qualified research under section 41(d)(4)(A) and paragraph (c)(2) of this section. X's activities relating to the development of a new or improved widget constitute a new research project to develop a new business component. X's research activities relating to the development of the new or improved widget, a new business component, are not considered to be activities conducted after the beginning of commercial production under section 41(d)(4)(A) and paragraph (c)(2) of this section.

Example 3. (i) *Facts.* X, a computer software development firm, owns all substantial rights in a general ledger accounting software core program that X markets and licenses to customers. X incurs expenditures in adapting the core software program to the requirements of C, one of X's customers.

(ii) *Conclusion.* Because X's activities represent activities to adapt an existing software program to a particular customer's requirement or need, X's activities are excluded from the definition of qualified research under section 41(d)(4)(B) and paragraph (c)(3) of this section.

Example 4. (i) *Facts.* The facts are the same as in *Example 3*, except that C pays X to adapt the core software program to C's requirements.

(ii) *Conclusion.* Because X's activities are excluded from the definition of qualified research under section 41(d)(4)(B) and paragraph (c)(3) of this section, C's payments to X are not for qualified research and are not considered to be contract research expenses under section 41(b)(3)(A).

Example 5. (i) *Facts.* The facts are the same as in *Example 3*, except that C's own employ-

ees adapt the core software program to C's requirements.

(ii) *Conclusion.* Because C's employees' activities to adapt the core software program to C's requirements are excluded from the definition of qualified research under section 41(d)(4)(B) and paragraph (c)(3) of this section, the wages C paid to its employees do not constitute in-house research expenses under section 41(b)(2)(A).

Example 6. (i) *Facts.* X manufactures and sells rail cars. Because rail cars have numerous specifications related to performance, reliability and quality, rail car designs are subject to extensive, complex testing in the scientific or laboratory sense. B orders passenger rail cars from X. B's rail car requirements differ from those of X's other existing customers only in that B wants fewer seats in its passenger cars and a higher quality seating material and carpet that are commercially available. X manufactures rail cars meeting B's requirements.

(ii) *Conclusion.* X's activities to manufacture rail cars for B are excluded from the definition of qualified research. The rail car sold to B was not a new business component, but merely an adaptation of an existing business component that did not require a process of experimentation. Thus, X's activities to manufacture rail cars for B are excluded from the definition of qualified research under section 41(d)(4)(B) and paragraph (c)(3) of this section because X's activities represent activities to adapt an existing business component to a particular customer's requirement or need.

Example 7. (i) *Facts.* X, a manufacturer, undertakes to create a manufacturing process for a new valve design. X determines that it requires a specialized type of robotic equipment to use in the manufacturing process for its new valves. Such robotic equipment is not commercially available, and X, therefore, purchases the existing robotic equipment for the purpose of modifying it to meet its needs. X's engineers identify uncertainty that is technological in nature concerning how to modify the existing robotic equipment to meet its needs. X's engineers develop several alternative designs, and conduct experiments using modeling and simulation in modifying the robotic equipment and conduct extensive scientific and laboratory testing of design alternatives. As a result of this process, X's engineers develop a design for the robotic equipment that meets X's needs. X constructs and installs the modified robotic equipment on its manufacturing process.

(ii) *Conclusion.* X's research activities to determine how to modify X's robotic equipment for its manufacturing process are not excluded from the definition of qualified research under section 41(d)(4)(B) and paragraph (c)(3) of this section, provided that X's

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research activities satisfy the requirements of section 41(d)(1).

Example 8. (i) *Facts.* An existing gasoline additive is manufactured by Y using three ingredients, A, B, and C. X seeks to develop and manufacture its own gasoline additive that appears and functions in a manner similar to Y's additive. To develop its own additive, X first inspects the composition of Y's additive, and uses knowledge gained from the inspection to reproduce A and B in the laboratory. Any differences between ingredients A and B that are used in Y's additive and those reproduced by X are insignificant and are not material to the viability, effectiveness, or cost of A and B. X desires to use with A and B an ingredient that has a materially lower cost than ingredient C. Accordingly, X engages in a process of experimentation to develop, analyze and test potential alternative formulations of the additive.

(ii) *Conclusion.* X's activities in analyzing and reproducing ingredients A and B involve duplication of existing business components and are excluded from the definition of qualified research under section 41(d)(4)(C) and paragraph (c)(4) of this section. X's experimentation activities to develop potential alternative formulations of the additive do not involve duplication of an existing business component and are not excluded from the definition of qualified research under section 41(d)(4)(C) and paragraph (c)(4) of this section.

Example 9. (i) *Facts.* X, a manufacturing corporation, undertakes to restructure its manufacturing organization. X organizes a team to design an organizational structure that will improve X's business operations. The team includes X's employees as well as outside management consultants. The team studies current operations, interviews X's employees, and studies the structure of other manufacturing facilities to determine appropriate modifications to X's current business operations. The team develops a recommendation of proposed modifications which it presents to X's management. X's management approves the team's recommendation and begins to implement the proposed modifications.

(ii) *Conclusion.* X's activities in developing and implementing the new management structure are excluded from the definition of qualified research under section 41(d)(4)(D) and paragraph (c)(5) of this section. Qualified research does not include activities relating to management functions or techniques including management organization plans and management-based changes in production processes.

Example 10. (i) *Facts.* X, an insurance company, develops a new life insurance product. In the course of developing the product, X engages in research with respect to the effect of pricing and tax consequences on demand for the product, the expected volatility of in-

terest rates, and the expected mortality rates (based on published data and prior insurance claims).

(ii) *Conclusion.* X's activities related to the new product represent research in the social sciences (including economics and business management) and are thus excluded from the definition of qualified research under section 41(d)(4)(G) and paragraph (c)(8) of this section.

(d) *Recordkeeping for the research credit.* A taxpayer claiming a credit under section 41 must retain records in sufficiently usable form and detail to substantiate that the expenditures claimed are eligible for the credit. For the rules governing record retention, see § 1.6001-1. To facilitate compliance and administration, the IRS and taxpayers may agree to guidelines for the keeping of specific records for purposes of substantiating research credits.

(e) *Effective dates.* This section is applicable for taxable years ending on or after December 31, 2003.

[T.D. 8930, 66 FR 290, Jan. 3, 2001, as amended by T.D. 9104, 69 FR 26, Jan. 2, 2004]

§ 1.41-4A Qualified research for taxable years beginning before January 1, 1986.

(a) *General rule.* Except as otherwise provided in section 30(d) (as that section read before amendment by the Tax Reform Act of 1986) and in this section, the term "qualified research" means research, expenditures for which would be research and experimental expenditures within the meaning of section 174. Expenditures that are ineligible for the section 174 deduction elections are not expenditures for qualified research. For example, expenditures for the acquisition of land or depreciable property used in research, and mineral exploration costs described in section 174(d), are not expenditures for qualified research.

(b) *Activities outside the United States—(1) In-house research.* In-house research conducted outside the United States (as defined in section 7701(a)(9)) cannot constitute qualified research. Thus, wages paid to an employee scientist for services performed in a laboratory in the United States and in a test station in Antarctica must be apportioned between the services performed within the United States and the services performed outside the