United States Tax Court

T.C. Memo. 2026-118

INTERMOUNTAIN ELECTRONICS, INC.,
Petitioner

v.

COMMISSIONER OF INTERNAL REVENUE,
Respondent

Docket No. 11019-19. Filed November 17, 2026.

Matthew S. Reddington, *Robert G. Wonish II*, *Coby R. Leslie*, *John H. Dies, Jr.*, *Janine M. Campanaro*, and *Jefferson H. Read*, for petitioner.

Christopher J. Richmond, *Jonathan D. Walker*, *Bryant W. Smith*, *Daniel J. Kleid*, and *Inga C. Plucinski-Holbrook*, for respondent.

MEMORANDUM FINDINGS OF FACT AND OPINION

BUCH, *Judge*: This case involves section 41[1] research credits claimed by Intermountain Electronics, Inc. (Intermountain), a corporation principally engaged in the business of manufacturing custom mining equipment. The Commissioner disallowed research credits claimed for 2012 through 2015 (years in issue).

The disallowed credits relate to thousands of projects; however, we instructed the parties to present evidence with respect to a representative sample of those projects. The issue for decision is

[1] Unless otherwise indicated, statutory references are to the Internal Revenue Code, Title 26 U.S.C. (I.R.C.), in effect at all relevant times, regulation references are to the Code of Federal Regulations, Title 26 (Treas. Reg.), in effect at all relevant times, and Rule references are to the Tax Court Rules of Practice and Procedure. All monetary amounts are shown in U.S. dollars and rounded to the nearest dollar.

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[*2] whether these projects (and by extrapolation, the thousands of projects) qualify for section 41 credits.

The parties put on evidence with respect to twelve of those projects. Most of those projects related to products designed and manufactured for delivery to Intermountain's customers. As to those projects, the attempt to allocate costs between routine manufacturing and research was conducted retrospectively, and the attempted allocation proved unreliable. Two projects, however, were designs of new products, and the parties agree that they constitute qualified research. Thus, of the twelve projects presented at trial, petitioner met its burden to establish that two of its projects qualified for the research credit. Regarding those two projects, petitioner provided credible substantiation of the amount to be taken into account to calculate the credit.

FINDINGS OF FACT

I. *Background*

Intermountain is a corporation with its principal place of business in Price, Utah. Intermountain is principally a manufacturer of custom electrical distribution and control equipment for underground and surface mining, among other applications.

Intermountain's story begins with a tragedy. John Houston received a degree in electrical automation technology in the early 1970s. He put his degree to use working as an electrician on both surface and underground mining equipment. A decade into his career, he found himself working for Emery Mining Co. Shortly before Christmas in 1984, 27 people died as a result of a mine fire at the mine where Mr. Houston worked. The following month, Mr. Houston founded Intermountain in Price, Utah, which initially focused on repairing and modifying electrical components used in the mining industry.

Intermountain started out repairing electrical equipment for mining operations. Tom Akers joined the company in the late nineties as a partial owner, leading Intermountain to focus on developing the business. Because of its growth in the mining industry, Intermountain established new facilities in Ohio and Illinois, near the Ohio Valley and the Illinois River Basin coal regions.

Over time, Intermountain began performing more complex services and designing custom products to meet the demands of the

[*3] mining industry. However, because of the cyclical nature of the coal mining industry, Intermountain needed to diversify. Intermountain opened its Denver, Colorado location to expand into the oil and gas industry.

By the early 2000s, Intermountain expanded into design and manufacturing control systems and mine-related power distribution equipment. Intermountain created custom electrical equipment, including control buildings, switchgears, transformers, variable frequency drive packages or controller packages, and skids. A transformer, also called a power center or load center, transforms voltage and provides circuits to operate individual pieces of underground equipment. A variable frequency drive (VFD) changes the frequency of the power signal of an AC motor to change the speed at which it operates. A skid is the structure at the bottom of a product on which an enclosure, outdoor equipment, or pumps rest. Intermountain also performed design and manufacturing work for electrical systems. To this day, Intermountain focuses on creating equipment that distributes power.

II. *Intermountain's Project Design Process for Custom Electrical Equipment and Custom Transformers*

A. *Phase 1 – Initial Design*

For custom electrical equipment and transformers, Intermountain's work begins with a customer need or request. Intermountain's business comes from its existing customer base, word of mouth referrals, and competitive bidding. Customers choose Intermountain for its technical expertise and ability to craft custom solutions for customer problems. For Intermountain's custom electrical equipment manufacturing, the customer typically comes to Intermountain with a problem, and Intermountain develops a product to solve it.

Intermountain's customers make requests of varying levels of complexity. Some customers provide drawings to Intermountain with the expectation that it would build their designs. Other customers provide a list of needs or specifications from which Intermountain can design and build a product. Intermountain declines projects when it is not confident that it can design and build a product that meets the customer's needs.

[*4] Intermountain works with its customers to create a list of specifications. To develop project specifications, Intermountain must consider many technical and environmental complications. Electrical installations in an underground mine present vastly different environmental challenges when compared to more typical above-ground electrical installations. Intermountain distinguishes itself from its competition by placing engineering staff, as opposed to salespeople, as the first point of contact for its customers. The engineering staff have the necessary expertise to identify the customer's concerns and technical requirements and to propose a design to address those concerns and requirements.

Scheduling considerations are at the forefront during the initial design stage. If Intermountain cannot meet a customer's deadline, they let the customer know ahead of time. Intermountain has an incentive to schedule things accurately because missing a deadline can cause residual delays for other projects.

Intermountain enters into fixed-fee contracts with its customers. Intermountain provides a preliminary design as part of its quote to a customer for a contract. This preliminary design shows the customer the major components of the product and explains their functions. Intermountain discusses the design with its customer to ensure the project meets the customer's needs and specifications. On the basis of this design, Intermountain provides a quote to the customer. After receiving the quote, a customer may issue a purchase order. Intermountain then typically issues a sales order acknowledgment, which includes an estimated date of completion for the product in that document.

Of course, Intermountain prices projects so as to profit from them. Intermountain seeks to accurately price projects to ensure the costs of labor and materials do not exceed the quoted price. To do this, Intermountain relies on specialized staff members who understand the engineering involved. If a design must change after the initial quote, the party that precipitated the change bears the cost.

B. *Phases 2 and 3: Mechanical and Electrical Design and Layout*

From the original designs, Intermountain creates the mechanical and electrical designs. These designs serve as instructions for the

[*5] production team. The processes for designing the mechanical and electrical layouts occur simultaneously.

After receiving the order, the assigned electrical engineer begins identifying the relevant parts to create the design. The electrical engineer prepares a series of electrical drawings and a list of necessary components. The electrical engineer determines whether certain products would function as intended and, if not, finds a suitable alternative. After the design is complete and a bill of materials is created, the project proceeds to a mechanical engineer under the direction of the project manager.

Mechanical engineering consists of drawing the product in 3–D and ensuring it complies with various requirements such as the relevant codes. Intermountain will often include in its designs equipment that it obtains from third parties. Intermountain relies on drawings from manufacturers or vendors to determine necessary information for the equipment. This information includes the equipment's weight, dimensions, how certain parts are mounted, its center of gravity, and how power goes either into or out of the equipment. The mechanical engineer uses this information along with the information from the electrical engineer. The mechanical engineer runs calculations on components such as the structural members of the project base frame to determine dead loads, live loads, and cable tray loads.[2] Creating the 3–D drawing involves sizing the structural members and locating and placing those members based on where the loads exist within the structure. When creating the drawing, the mechanical engineers also factor in information collected from weather and seismic data. This information assists Intermountain in calculating the appropriate building supportive structures.

Intermountain faces unique challenges in creating the electrical designs for applications in mines. Electricity travelling through mines may be subject to voltage drops. Intermountain also needs to consider how power loads affect the system.

Intermountain also encounters challenges in creating the mechanical design and layout. Intermountain needs to create products

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[2] Dead loads are the weight of the permanent elements of a building or structure. Live loads are the weight of intermittent variables occurring on the building or structure, including personnel walking across the floor or seasonal snow landing on top of a structure. And cable tray loads are the weight of the cable tray which is used to hold electrical cables inside equipment.

[*6] that withstand a variety of environmental factors, both above and below ground. Products situated above ground need to withstand weather conditions common to surface mines such as dusty river basins and deserts. Below ground, the products are placed in direct proximity with caustic materials such as soda ash, potash, and salts.

Intermountain creates products that account for a variety of factors. One of those factors is the size constraints of an underground mine, which affect the entire product, including ventilation, cooling, and airflow. To address these constraints, Intermountain conducts computational fluid dynamics to ensure proper ventilation and circulation.

Intermountain also needs to create equipment that can enter different kinds of mines through either tunnels or shafts. Occasionally, the equipment a customer requires has dimensions that, when the equipment is upright, exceed the length or width of the tunnel or shaft. Thus, installing the equipment requires that it be tilted in such a way that it will pass through the tunnel or shaft before reaching its ultimate installation destination. This requires special engineering to allow equipment that is intended to be installed upright to be tilted and rotated during the installation process. Intermountain also needs to ensure that equipment can withstand delivery across dirt roads and into mines. This requires mechanical specifications that can withstand a high degree of abuse. Finally, Intermountain needs to build equipment that can operate safely around hazardous or explosive gases. The equipment must be designed and built to contain any sparks within the equipment so as to avoid possible explosions. For example, equipment for use in the extraction of oil and gas contains systems to monitor levels of methane, propane, and other potentially dangerous gases.

Despite these challenges, Intermountain is well equipped to face them. Intermountain maintains a standard parts library to use in designing its projects. Intermountain ensures that its projects are designed and built by experts who understand the products and applications. Intermountain assigns projects according to each project manager's particular expertise.

Intermountain uses specialized software to design its projects to meet the structural stresses to which they will be exposed. An engineer enters project information into the application, which calculates the amounts of bending stress, deflection, and shear stress a part will encounter. This permits engineers to determine whether a selected part

[*7] can withstand the anticipated stress. Engineers also need to calculate the centers of gravity of projects to determine pick points and determine the load and stress.

To calculate heat loss, Intermountain's engineers take information provided by vendors of various components and input them into a program to calculate heat loss. To ensure compliance with various code requirements, an Intermountain engineer inputs information into a computer program that will confirm whether a proposed design is in compliance.

If possible, Intermountain relies on past designs to form the basis for new ones. Intermountain's staff discusses all revisions to designs. Sometimes revisions are necessary because a vendor makes a change to a part used in a project. Some of Intermountain's customers require Intermountain to seek its approval before revising a drawing, while others do not.

Intermountain models its projects using 3–D drawing software. The software enables the engineers to rotate the model and review it from different angles and elevations. Intermountain's engineers use the software to visualize the assembly of parts to see whether parts overlap or collide, to line up parts, and to check clearances. The software calculates an object's center of gravity and accounts for the weight of the components.

C. *Phase 4: Pre-Production Review*

Before fabrication, every project undergoes an electrical review and a mechanical review. The electrical pre-production review consists of confirming the appropriateness of building materials and the electrical components. The mechanical pre-production review sometimes requires reworking a design. The manufacturing team works with the mechanical design team to identify any barriers to manufacturing the final product. At times, reworking a design takes anywhere from one day to two months, and Intermountain may have to rework significant portions of a design. Once the internal reviews and the reviews by the client are complete, Intermountain prepares construction drawings.

D. *Phase 5: Laser Cutting and Bending*

Intermountain works with heavy 10-gauge steel to create custom parts for its projects. It laser cuts steel to meet precise specifications.

[*8] Intermountain cannot buy precut steel that meets its needs and tolerances.

E. *Phase 6: Fabrication and Final Assembly*

The fabrication process includes construction, painting, piping, and skid construction. Individuals involved in the manufacturing process sometimes encounter issues and provide feedback or ideas on how to resolve an uncertainty in the project design. "Painting" is more than mere painting; the paint department ensures that the products have the necessary protective coatings to meet project requirements of the environment where the product will be installed. The piping department is responsible for custom welding.

F. *Phase 7: Testing and Quality Control*

Testing and quality control are separate departments. The testing department conducts functional testing to check for engineering or design flaws and to ensure the product functions as designed. Quality control evaluates the product to ensure that the already-functioning product meets Intermountain's quality standards.

Intermountain measures the functionality of the product using its Transformer Test Report. The results of the testing undertaken for custom transformers are published in the report. These tests check the resistance, termination, and density of transformer coils, the core steel, the system voltage, the functionality of the design, and Occupational Safety and Health Administration sound requirements. Although necessary and helpful, the testing does not allow Intermountain to simulate the environmental conditions at the ultimate installation site.

A transformer consists of four components that are designed and fabricated in parallel: the insulation system, the coil winding, the core steel, and the clamping system. Most of the testing is done before the entire product is dipped in resin and baked. After the resin is applied, alterations to the transformer are impossible without breaking the steel and coils. Intermountain submerges coils in resin and puts them under pressure for several hours and bakes them before testing them again. After testing, the entire assembly is dipped in resin. A failed transformer can overheat, which can lead to catastrophic fires, injuries, and even death.

[*9] III. *Intermountain's Project Process for Proprietary Product Development*

In addition to building custom electrical equipment, Intermountain also develops specialized proprietary products.

A. *Phase 1: Product Development/Product Architecture*

The first phase of Intermountain's proprietary product development is the development phase or project architecture phase. In the development phase Intermountain conceptualizes the product it intends to design and fabricate.

At the outset of the project, Intermountain evaluates one or more alternatives regarding the appropriate design and architecture of the product. Intermountain undertakes a design process that involves forming hypotheses, testing them, and adjusting them as necessary. Intermountain also creates simulations to evaluate the feasibility of a conceptual design.

After the completion of the initial concept design, the project manager sends a product specification sheet to Intermountain's stakeholders. The sheet contains more detail regarding the proposed design and initial diagramming.

B. *Phase 2: First-Level Prototype Design*

The second phase of Intermountain's product development process is to create a first-level prototype. To be able to review and test a first-level prototype, Intermountain uses software that tests all the inputs and outputs in the electronics and makes sure that all the electronics function properly.

Once Intermountain has an initial design, it creates a schematic design for its first-level prototype. The 3–D modeling is completed by a mechanical engineer or draftsman with computer-aided design and drafting (CADD) software. Once completed, the drawing goes to an Intermountain employee, Dale Curtis, who oversees Intermountain's internal research and development department. He works on all of Intermountain's proprietary products. The design is then input into a circuit board design program to graphically design the circuit board.

The 3–D modeling software resolves some but not all uncertainties surrounding product feasibility. The software does not tell

[*10] the designer whether the electrical componentry is going to interact appropriately or whether its initial electrical design is functional. Although Intermountain creates 3–D models for all the important components in a product, other elements of the product (such as wiring) are often excluded from the model.

Mechanical design has a direct effect on the electrical design of a product. If spaces are too narrow, electrical components can create an electric arc. The Mine Safety and Health Administration (MSHA) of the U.S. Department of Labor has strict safety standards regarding the level at which electric currents may leak into one another, to avoid the creation of hazardous conditions.

Once the 3–D model is approved, Intermountain converts that model from a 3–D perspective to a 2–D drawing. The 2–D drawings are then prepared for approval and phase two prototype fabrication.

C. *Phase 3: Second-Level Prototype Fabrication*

The next phase is what Intermountain refers to as the "P2 Development Phase." In the development of the second-level prototype, Intermountain evaluates all the data that it gathered from the design and review of the first-level prototype to make all the necessary design modifications. Before Intermountain begins fabrication of the second-level prototype, they run calculations and use computer simulations on the circuits to test the engineering.

Intermountain tests the second-level prototype using an "alpha release code," which is testing software with all relevant functions and features built into it. Throughout this phase, Intermountain thoroughly evaluates and tests the second-level prototype while also making improvements. Intermountain then fabricates the second-level prototypes, assembles them, tests them, and finds any mistakes in its design. The team sometimes repeats the process until the second-level prototype passes its final functional review and the team is ready to obtain approvals.

D. *Phase 4: Pre-Production Review*

The fourth phase of Intermountain's product development design process is the Pre-Production and Approvals phase. This phase involves preparing the product for release. A product can take years to go from phase 1 to the pre-production phase. It is not uncommon for Intermountain to discover additional material failures in the product at

[*11] this phase, which would then require returning to the proverbial drawing board to improve the design.

E. *Final MSHA Approval Requirements*

Before Intermountain can introduce a newly designed product into the stream of commerce, MSHA must approve it. To meet MSHA requirements, Intermountain relies on simulations and its familiarity with MSHA requirements.

IV. *Financial Data Tracking*

During the years in issue, Intermountain used Enterprise Resource Planning (ERP) to track financial data by using a single system to account for every project, order, quote, and invoice that was generated. ERP maintained both contractor costs and supply expenditures. The system allowed Intermountain to track costs from when a product, component, or material was either purchased, received, or added to a job. Intermountain used an ERP system called Epicor to track and generate every project, order, quote, and invoice. Hourly employees did not enter time into Epicor before a project was released to the production floor. Engineers typically did not log their time in Epicor. Salaried employees did not have any time tracking requirements.

V. *alliantgroup Study*

For the years in issue, Intermountain hired alliantgroup, LP (alliantgroup), a tax consulting firm, to conduct a section 41 research credit study. Intermountain provided financial records and documentation to alliantgroup to substantiate and quantify the amounts of qualified research expenditures incurred for 2010 through 2015, inclusive. These financial records included the gross salaries of its employees. Intermountain provided alliantgroup with explanations for multiple projects.

After reviewing the provided records, alliantgroup used a statistical sampling method to determine the amounts of Intermountain's activities that might count as qualified research during the years in issue. Once the sample was drawn, alliantgroup conducted interviews with representatives of Intermountain. The people who were interviewed had experience overseeing a particular project or historical knowledge of a project. After estimating the amount of qualified research, alliantgroup quantified its findings in a calculation summary.

[*12] This summary included a chart summarizing the gross salaries of Intermountain's employees and the qualifying research expenditures.

The record does not contain a study for 2015; however, the corporate representative for alliantgroup testified that alliantgroup performed a study for that year.

VI. *Amended Returns and Audit*

Relying on the alliantgroup reports, Intermountain amended its 2012 through 2015 tax returns to claim research credits. Intermountain claimed the following credits or carryforwards for each year:

Tax Year	*Research Credit Claimed*
2012	$1,458,436
2013	1,526,866
2014	1,559,625
2015	1,118,811

The Commissioner selected Intermountain's tax returns for 2012 through 2015 for examination. On April 19, 2019, the Commissioner issued a notice of deficiency to Intermountain, disallowing research credits and credit carryforwards, and determined the following deficiencies:

Tax Year	*Deficiency*
2012	$880,433
2013	1,051,499
2014	498,847
2015	873,332

Intermountain timely filed a Petition with this Court for redetermination of the deficiencies.

[*13] VII. *Trial Projects*

During the years in issue, Intermountain generated expenses for thousands of projects for which they claimed research credits. Given the number of projects for which petitioner claimed research credits, the parties agreed to present at trial a sample of twelve research projects (trial projects). Our conclusions with respect to these trial projects are not binding as to the remaining research projects. Rather, it is the Court's expectation that this Opinion will enable the parties to mutually resolve the credits for the remaining projects. *See Phx. Design Grp., Inc. v. Commissioner*, T.C. Memo. 2024-113, at *10–11.

The parties each selected six projects for a total of twelve projects. These projects are individually labeled by Intermountain's internal reference numbers: 20047X, 205662, 209564-1-1, 209873-1-1, 210464-1-1, 210554-1-1, 208277-2-1, 024649-1-1, 206901-1-1, 69545, RD-0000, and RD-0009. In a stipulation of settled issues, the Commissioner noted that he does not stipulate the extrapolation of the results of the trial projects to all of petitioner's projects during the years in issue.

A. *Project 20047X: Hillsboro Longwall Project*

1. *Longwall Mining*

In general, there are two kinds of underground mining: continuous and longwall mining. Continuous mining systems mine coal or other minerals by drilling straight into the rock with small machines. Conversely, longwall mining systems mine seams of coal or other minerals with a machine that passes in front of the coal and shaves it away layer by layer. The seam of coal a longwall system mines is called a longwall face. Longwall faces are generally the length of a city block and can range from 1,000 feet to a mile wide.

A longwall mining system is highly mechanized. At the cutting edge is a "shearer," which can include either one or two cutting heads studded with pegs, spikes, or blades, referred to as "bits." Beneath the entire path of the shearer is a "face conveyor," a conveyor belt that catches the coal that is sheared off the wall. The face conveyor transports the mined materials to a "head gate" where it falls onto a "stage loader." A stage loader is another conveyor that is at 90 degrees to the face conveyor. A crushing device on the stage loader pulverizes the coal before it continues to the main line conveyor up to the surface.

[*14] Above the track of the shearer and conveyor belt are ceiling shields controlled by hydraulic power. The shields are numerous and set side by side along the coal block. The shields use large hydraulic rams to support the roof and prevent the roof from collapsing into the mining area. As the shearer passes the shield, it creates a void of unsupported ceiling. The shields must then reposition themselves to the newly exposed coal face.

2. *Intermountain's Experience with Longwall Mining*

Project 20047X, the Hillsboro Longwall project, was the first longwall mining system Intermountain produced. It was completed in 2012. The Hillsboro Longwall project included various subprojects.

Although this was the first longwall mining system produced by Intermountain, it had experience working on longwall mining equipment before undertaking the Hillsboro Longwall Project. Between 2009 and 2012, Intermountain was exposed to longwall mining projects through repair and rebuilding projects for a variety of clients. Since as early as 1985, Intermountain has maintained electrical components for longwall systems. Additionally, it had been rebuilding components for longwalls since at least 1997. Intermountain's prior custom electrical equipment works for longwall systems included bringing longwall machinery into its facilities to overhaul, update, or redesign its electrical systems. Intermountain also had experience rebuilding power centers, working on master controllers, and fixing or rebuilding several parts for longwall systems.

3. *Hillsboro Longwall Mining Project*

Hillsboro Energy (Hillsboro) hired Intermountain to design and build a complete underground longwall system. Hillsboro wanted Intermountain to build an electrical system that powered the face conveyor, the stage loader, the crusher, and all the safety systems within those electrical systems. During the bidding process, Hillsboro Energy provided Intermountain with information about necessary features of the final product. Hillsboro and Intermountain worked together to develop ideas for new functions and features that could be used to create an improved longwall system. The design of the final product was not clear to Intermountain at the outset of the project.

After the initial meetings, Intermountain presented a preliminary design to Hillsboro. Hillsboro provided Intermountain with basic product constraints but did not specify the design of the final

[*15] product. After Hillsboro transmitted these constraints, Intermountain began designing the final product.

4. *Project Design*

Intermountain's design needed to resolve a variety of problems Hillsboro was facing with its longwall mining operation. Solutions to one problem would sometimes yield new obstacles, which would require a design process to resolve. We will address each of the problems and its corresponding solution.

a. *CAT Tracks and Monorail System*

A longwall mining system requires equipment to deliver electricity to the system. This equipment is typically located at the mine headgate and includes several separate housing units for transformers and other electrical devices. As the shearer progresses, it travels further from the otherwise stationary electrifying equipment. Periodically, the electrifying equipment must move closer to the shearer.

Before enlisting Intermountain, Hillsboro's process to move this electrifying equipment was labor intensive. Hillsboro attached steel beams to the bottom of the housing units, and laborers would haul the units in what amounted to a "game of leapfrog." Additionally, Hillsboro's system attached cables or hydraulic lines to a monorail on the ceiling, which operated as a festoon system. Moving the cables and hydraulic equipment was a labor-intensive operation that required workers to pull down cables weighing twenty-five pounds per foot and rehang them.

To solve this issue, Intermountain proposed self-propelling electrical housing units. The design would add continuous tracks of interconnected metal plates that wrap around wheels, referred to as CAT tracks, to the bottom of the housing units of the longwall train. The tracks would propel the equipment alongside the shearing mechanism without the need for additional intervention.

The train would have five cars: a 3-megavolt power center, a 9-megavolt power center, a starter car, a variable frequency drive car, and a production car. Intermountain affixed CAT tracks to only some cars, while the others just had wheels. After calculating the weight of the train, Intermountain determined the longwall train would also need another engine. The train moved at 4 to 5 miles per hour and could be steered via remote control. Intermountain designed the CAT tracks and wheels to function even given the unlevel nature of a mine floor and the

[*16] presence of debris. The design included heavy duty connecting devices to attach each of the cars to one another.

Intermountain first planned the electrical details, such as the number of cars needed in the train and what equipment could be fit into each car. After the initial electrical layout began, Intermountain involved the mechanical engineering design team to incorporate automation into the design.

The monorail system was designed to be mounted to the ceiling, from which equipment would hang from rollers overhead. The system was made of a six-inch steel I-beam that runs for miles down the entryway of the longwall system to the mouth of the mining section. The stage loader, the transformer, and variable frequency drive sections were hooked to the monorail system by cables and moved with the monorail system. The whole train of cars moved in unison with the monorail. This alleviated the need for workers to physically move the festooned cables, because the cables are attached to the longwall train.

This project represented Intermountain's first design integrating CAT tracks into a longwall system. Pat Lemmon, Intermountain's project manager for this project, had experience with CAT tracks in other contexts.

b. *Hydraulic Pressure*

Hillsboro's prior system did not deliver constant pressure to its shields when moving. To solve this problem, Hillsboro and Intermountain discussed the possibility of adding a variable frequency drive to control the longwall pump. Integrating a variable frequency drive into the pump system was a challenge for Intermountain. A variable frequency drive takes input voltage, converts it, and puts out a variable voltage and frequency to control a motor at a desired speed. This process generates a significant amount of heat.

The variable frequency drive systems Intermountain used in the Hillsboro project were relatively large at six feet tall. The mining conditions placed sizing constraints on the design, which required Intermountain to design the variable frequency drive to be horizontal, creating additional heat. Intermountain's design had to account for that additional heat.

[*17] c. *Coal Spillover*

Another problem was that the main line conveyors would often become overloaded with mining materials. Overloaded conveyor systems lead to spillage, which creates excess waste, inefficiency, and MSHA violations. Coal was overflowing because Hillsboro could not control the rate at which the conveyor system transported the coal coming off the rock face.

To solve the spillover issue, Intermountain introduced a variable frequency drive into the system. By delivering power to the stage loader at any desired frequency, Hillsboro could control the rate of the stage loader and, thus, control the flow of coal to the mainline conveyor.

d. *Custom Transformers and Safety*

Intermountain custom designed a 9,000 kilovolt transformer, which was integrated into the 9 megavolt power center. Because of size constraints, Intermountain designed the 9,000 kilovolt transformer to be split across three parts, each containing 3,000 kilovolt transformers. The core assemblies were then interconnected to act as one 9 megavolt transformer.

The electrical design of the 9 megavolt power center went through a minimum of 10 revisions. The mechanical design of the 9 megavolt power center went through twice as many design drawing revisions because the mechanical design changes when the electrical design changes. The design of the 9 megavolt power center also depended on the design of the starter car.

Intermountain also designed the controller, the "brains of the system." The controller is located at the head gate and acts as an interface between the operators and the equipment. The controller provides vital readings on pump pressure, which equipment was on or off, and the current on the tail drive. Most of the safety components are in the controller. If there were any changes to the mechanical or electrical design of other longwall components, it would affect the design of the controller.

Intermountain included an additional custom feature in the variable frequency drive power cars and the starter car to permit maintenance without interrupting mining. Intermountain developed an innovative design for what it called "draw-out drawers." Draw-out drawers included controls on a panel that would swing out and allow

[*18] access to the back of the cabinet. Intermountain built spare circuits so that workers could access the drawers without interrupting the longwall operation.

As the electrical design was developed, Intermountain had several requirements to monitor. It had to ensure compliance with MSHA standards, make preliminary calculations, and determine how the components would work together electrically and mechanically. Intermountain would enlist an employee who was unfamiliar with the electrical design to conduct an independent review comparing the original bill of materials to the electrical schematics to determine discrepancies.

5. *Project Testing*

Intermountain ran a series of simulations to check for failures in the system. Intermountain performed the first test on the equipment at its location in Price, Utah. The test looked at electrical clearances, transformers, and vacuum contactors. During the test, Intermountain identified issues with individual parts.

Next, the system was sent to Centralia, Illinois. There, Intermountain conducted further testing of individual pieces of the full system and MSHA conducted a safety inspection. Intermountain tested communication between the components and created additional programming to address issues it identified.

Intermountain could fully test the longwall system only with environmental factors in the Hillsboro mine. After installation in the mine, Intermountain subjected the system to more rigorous testing and found additional issues. One such issue required Intermountain to remove the newly designed draw-out drawers and send them back to its Centralia facility for modification.

6. *Employee Hours*

The record shows inconsistent hours worked by Intermountain employees on seven subprojects. One exhibit contains eight entries for engineering hours for seven Hillsboro longwall subprojects: 174, 87, 31, 41, 25, 2, 4, and 10 for a total of 374 hours.[3] That same exhibit shows

[3] Although only seven subprojects are listed, the exhibit showing these hours worked contains eight entries. One subproject number is listed on two separate lines, with different hours worked on each line.

[*19] manufacturing hours as 1,177, 931, 173, 247, 215, 70, 105, 122 for a total of 3,040 hours.

Another exhibit records employee hours for the same subprojects in the following table:

Project	*Engineering*	*Fabrication*	*Final Assembly*	*Laser*	*Paint*	*Test*
200473-1-1	93.2	435.31	554.81	46.63	33.99	21.49
200474-1-1	43	333.4	476.85	27.06	27.38	33.2
200474-2-1	30.96	104.32	35.42	11.93	11.09	0
200475-1-1	36.18	36.04	162.08	11.92	20.1	6.39
200476-1-1	3.06	-	202.43	-	-	2.05
200476-2-1	6.08	64.96	71.66	11.22	21.8	4.91
200477-1-1	9.67	38.12	58.6	7.67	17.28	0.01
TOTALS	222.15	1,012.15	1,561.85	116.43	131.64	68.05

B. *Project 205662: Kearl Oil Sands Expansion Project*[4]

Imperial Oil owned an oil sands location in Alberta, Canada. Oil sands mining is an open-pit mining process that removes the overburden to get to oil sands. The oil sands are trucked to a site where oil can be extracted from the oil sands.

ThyssenKrupp Robins, Inc. (ThyssenKrupp), is a construction contractor that was hired by Imperial Oil to build out an oil sands removal project. ThyssenKrupp then hired Intermountain to build the electrical houses (e-houses) that would contain the electrical controls for the equipment used in the extraction process. The project was larger than Intermountain's typical projects. Intermountain initially provided ThyssenKrupp a quote for fifteen e-houses but later reduced the number to seven. Shortly thereafter, Intermountain and ThyssenKrupp entered

[4] Kearl Oil Sands project included several subprojects. These subprojects included the following: 205662-1-1, 205662-2-1, 205662-3-1, 205662-4-1, 205662-5-1, 205662-6-1, and 205662-7-1.

[*20] into a purchase order for seven e-houses. Intermountain agreed to not retain any rights to use the work it created.

1. *Contract*

The parties entered into a purchase agreement labeled "General Conditions of Purchase." Section 20 of this agreement governed "Drawing, Intellectual Property." This section contained the following provisions:

> 20.1 The Purchaser *shall remain the owner of all its intellectual and industrial property rights*, but hereby *grants to the Supplier the right to use such intellectual and industrial property rights solely for the purpose of producing the Work and for no other purpose*. The Supplier *guarantees not to disclose to any third party or to use for any further project*, Purchase Order or etc., any documentation, Specification, samples, drawing, patent / license or other information furnished to Supplier in connection with this Purchase Order. The Supplier undertakes to execute a confidentiality agreement prior to the performance of the Work to the Supplier's employees and the Sub-Suppliers.
>
> 20.2 The Supplier shall remain the owner of all its intellectual and industrial property rights but hereby grants to the Purchaser, the permission to include any and all of the Supplier's intellectual and industrial property rights furnished or to be furnished by the Supplier to the Purchaser under this Purchase Order into the documentation to be supplied by the Purchaser to the Owner.
>
> Supplier, warranting that it has the right to do so, hereby grants to Purchaser, *its affiliates and successors a perpetual, irrevocable, royalty-free, worldwide, transferable, nonexclusive license and licensing right under all its intellectual and industrial property rights, patents and know-how rights now or hereafter owned or controlled by Supplier which cover any apparatus, article, process or composition used or produced in the use of the Work, including the right to erect, commission, use, sell, operate, maintain, repair, replace, reconstruct, re-make, alter, or*

[*21] *modify the Work and all parts thereof and to sell products thereof*. The rights granted to Purchaser by the Supplier under this article shall be assignable by Purchaser to any party to whom Purchaser may transfer all or part of title to the Purchase Order.

> 20.3 If Supplier or *any of its personnel make any inventions, discoveries, or improvements patentable or unpatentable resulting from their activities under the Purchase Order (collectively, "Inventions"), Supplier shall promptly disclose those Inventions to Purchaser in writing*. *Inventions covered in this section shall include those conceived during the term of the Purchase Order and within one (1) year thereafter*. Further, Supplier hereby assigns, and shall require its personnel to assign, each such Invention to Purchaser. Supplier also shall require such personnel to execute such papers as Purchaser requests in connection with any assignment and in connection with the acquisition of patent letters, in any jurisdiction, on any Inventions.

(Emphasis added.) The passage contains several defined terms. Purchaser refers to "Krupp Canada Inc. including its affiliates and duly nominated representatives." The Purchase Order is defined to include "all documents attached . . . the Specifications and these General Conditions of Purchase." Supplier refers to "Supplier including its affiliates, duly nominated representatives, Sub-Supplier, vendor . . . (a) officers, directors, employees, agents and representatives, and subsidiary and affiliated (including parent) companies of entities; and (b) officers, directors, employees, agents, and representatives of such subsidiary and affiliated companies of Sub-Supplier." Work means "the whole of activities, Services, materials, equipment, spare parts, accessories, software, documentation, matters and things required to be done, delivered or performed by the Supplier in accordance with the terms of the Purchase Order."

Additionally, the contract contained provisions for transfer of title of the work product. Section 26, entitled "Title," provides that

> the Work shall be delivered free of all and any charges, liens, and other encumbrances whatsoever and that the Supplier has a good and marketable title to the Work and that no patent, trademark design or copyright is or will be

[*22] infringed by the provision of the Work or Services. Title to Work provided under this Purchase Order shall pass to Purchaser upon the earlier to occur of: (i) first payment therefore by Purchaser or (ii) delivery to the Delivery Point.

2. *Project Design*

The mechanical engineers needed to account for each piece of equipment contained within the finished product as well as how those pieces of equipment interacted. Each piece of equipment could be affected by voltage, amperage, and other electrical issues. Mechanical engineers began this process of designing the e-houses by examining all known major pieces of equipment to determine weight, mounting requirements, dimensions, and cable routing.

Intermountain also needed to design and manufacture a unique cable tray. A cable tray is a trough made of aluminum with rungs through the center, which is used to run cables overhead. Requirements for cable trays differed for each of the seven e-houses. This is so because the location of the equipment and the number and size of cables would require a change in the layout and size of each cable tray.

ThyssenKrupp provided Intermountain with a specifications package and a general arrangement drawing at the beginning of the project. The specification package had a list of all the codes that needed to be met for every item on the site, not just the e-houses. The general arrangement drawing was a top view drawing that gave dimensional details about the equipment in the e-house. The information contained in the dimensional drawings had discrepancies and presented design challenges for Intermountain's engineers.

a. *Mechanical Design*

The mechanical engineers created a 3–D model to map the configuration of the components of the e-houses. All of the components needed to work in harmony. The 3–D models needed to account for how the placement of equipment could increase the stress on the housing unit. Intermountain examined data sheets, sized the individual components, and modeled the placement of the components using a CADD modeling program, to create a general arrangement of the structure. Intermountain's engineers reviewed the models with the client to ensure the components did not contain code violations, electrical issues, or general safety concerns. As Intermountain added more features to the model, clashes between equipment placement could

[*23] force the mechanical engineers to redo portions. Intermountain also had to confirm the e-houses maintained the necessary walkway and clearances.

Intermountain also designed the heating, ventilation, and air conditioning systems for the e-houses. It calculated heat loss by piece of equipment, along with the losses and inefficiencies of the air conditioner. This allowed them to determine the appropriate size and placement of the cooling equipment.

Once Intermountain determined where the electrical equipment would sit in the housing unit, it modeled the base frame. The base frame consists of structural steel members in the bottom of an e-house and the cross channels that run underneath and support the weight of the electrical components.

Lastly, Intermountain performed structural calculations related to the entire e-house. Intermountain would submit these calculations, mechanical drawings, and electrical drawings to ThyssenKrupp for review. ThyssenKrupp would return marked-up versions of the drawings with requested changes.

Engineers followed this process all the way through production and final testing to address any problems with construction. At the conclusion of the design process, Intermountain conducted a fabrication and engineering design review for each project. Once the design was approved, the e-houses were approved for assembly.

b. *Cable Tray Design*

Intermountain created a cable schedule that showed every cable within each e-house and how each connected to all of the equipment. The cable schedule listed the cable types, clamp, and connection points. Engineers used calculations to ensure that each met the requirements for voltage and amperage and to determine the type of conductor, power requirements, and length.

Creating cable schedules enabled engineers to create designs for the cable trays. The electrical engineering for the cable tray involved determining the sizing and routing. Mechanical engineers determined the fit of the cable tray within each e-house based on the initial electrical engineering.

[*24] The design of the cable trays accounted for several factors. The engineer designing cable tray needs to consider the type and purpose of the cables. Cables powering a motor cannot sit next to ethernet or communication cables because they will cause interference. Intermountain needed to design cable trays to keep these cables an adequate distance apart.

Intermountain used barriers to address the problem of cross-cable interference. Intermountain's engineers determined the proper location of the barriers within the tray by calculating and modeling the weight and dimensions of the cables and comparing them with the capacity of the tray as well as the cable's ability to be stacked on another.

Some of the e-houses were designed as mirror images of one another, which posed unique challenges. Equipment manufacturers did not create mirror image versions of equipment. For example, equipment in an e-house might have a connection on one side of the equipment or a door on a piece of equipment might swing in only one direction. Mirroring the e-house structure required redesigning the interior layout because, although the structure would be reversed, the doors and connection points would not. Therefore, Intermountain had to change the cable layout to accommodate the mirror image e-houses.

Engineers needed to design cable trays to account for the various cable connections. Intermountain first needed to determine how to properly connect each cable. There were multiple possible means of connecting the cables for each piece of equipment. The aluminum trays interacted with the different metals in the equipment and cables. Engineers needed to evaluate for differences and determine means of grounding and bonding the cable tray to the equipment so that it would not create a shock or damage to the equipment. The engineers also needed to account for differences between metals that might lead to corrosion.

3. *Testing*

Intermountain often got to the testing or installation phase only to identify unanticipated design issues. Frequent design issues included clashes or interferences between pieces of equipment. Clashes or interference arose from slight differences between real-world equipment and the dimensional drawings taken from datasheets. Production employees would occasionally encounter design flaws that would prevent them from accessing points with a welder or would be unable to

[*25] fit screws. Once production employees identified a design issue, they raised it with their leads, who brought the issue back to the mechanical or electrical engineer. The engineers would then evaluate whether a potential solution would affect any major calculations, such that the larger design of the project would be affected.

Intermountain conducted tests to verify that the equipment was functioning correctly. The testing was done during and after construction and verified that the e-houses were constructed according to the drawings and that the design itself could be built. When problems arose, engineers needed to determine whether the problem was in the construction or with the underlying design.

4. *Employee Hours*

The records for the reported hours for the Kearl Oil Sands project are unclear. One exhibit shows the hours reported by the single mechanical engineer on the project. In the exhibit, three of the subprojects, 205662-2-1, 205662-5-1, and 205662-6-1, are not referenced. Additionally, the engineer reported 33 hours to project 205662-1-1, 39 hours to project 205662-3-1, 63 hours to project 205662-4-1, and 19 hours to project 205662-7-1, with a "Clock In Date" of February 24, 2014. However, there are different dates listed for the "Create Date" and "Change Date" for those same hours.

Another exhibit records employees' hours for the same project in the following table:

Project	*Engineering*	*Fabrication*	*Final Assembly*	*Laser*	*Paint*	*Test*
205662-2-1	2.17	3.2	-	-	-	-
205662-1-1	55	760.47	2,261.47	75.29	64.8	-
205662-5-1	105.99	774.61	2,024.65	84.1	149	17.79
205662-3-1	-	250.53	16.41	33.86	13.57	-
205662-7-1	62.69	1,059.32	2,402.36	56.13	95.17	-
TOTALS	225.85	2,848.13	6,704.89	249.38	322.54	17.79

[*26] The hours reported for the engineers in this table include the hours for three additional engineers.

C. *Project 209564-1-1: Tallgrass Holyoke E-House*

Project 209564-1-1, the Tallgrass Holyoke e-house, was the first of a set of five e-houses that Tallgrass Energy purchased from Intermountain. Because this was the first e-house completed for the project and the remaining e-houses were considered duplicates, Intermountain claimed only the first of the Tallgrass Holyoke e-houses as qualified research. The overall Tallgrass Holyoke project involved several buildings installed at intervals along a pipeline to boost or maintain pressure within the pipeline.

1. *Design*

The primary design challenge was the client's requirement that all equipment be housed together. This presented a challenge because of the overall weight of the e-house, the amount of required equipment, workspace clearances, voltage-related clearances, and the potential for overheating. To mitigate excessive heat Intermountain affixed air conditioning units to the roofs of the e-house.

Additionally, on the electrical side, the mix of systems and voltages required cables to be isolated from one another. Safety required Intermountain to route cables separately, which could create further issues with the ductwork in the structure.

To address these concerns, Intermountain's mechanical engineers designed the first of the five e-houses. To do this, the mechanical engineer needed to know the general arrangement of equipment the customer required, the customer's specifications, and applicable building codes. The design also needed to account for environmental conditions such as wind loads, dead loads, live loads, seismic issues. The engineer also considered the building support foundation mechanism, major equipment and its respective weights, insulation requirements and limitations, and energy efficiency requirements.

The size of the e-house required Intermountain to introduce extra supporting structures to withstand high windspeed. At the time, it was the longest building Intermountain had ever built. To prevent the building from overturning, Intermountain built a "moment frame." To design a moment frame, the engineer measures wind speed to determine the live load and designs the frame to withstand that amount of force.

[*27] Intermountain's engineers used a computer application to simulate the distribution of weights.

Intermountain used software to calculate the energy efficiency of the project. The software evaluated thermal resistance of assemblies, insulation, wattages, cooling, and heating. The engineers used the software to determine the insulation values and whether the building is energy efficient. If it is not, the software will alert the user.

Because of the size and uneven weight distribution of the e-house, Intermountain needed to develop a lift plan to hoist it onto the truck. To determine the centers of gravity for the building, engineers used another program to simulate weight distribution for the building and its components. This allowed the lift plan to depict the center of gravity and adjust rigging for an even lift.

2. *Employee Hours*

The record shows inconsistent information for the hours worked by Intermountain employees on the Tallgrass Holyoke e-house. One exhibit shows the engineering, laser, fabrication, paint, final, and testing hours as 18.62, 68.64, 546.90, 205.83, 796.25, and 4.45 hours respectively, for a total of 1,640.69 hours. However, the engineer testified that he applied engineering time to another e-house completed for the same overall project.

D. *Project 209873-1-1: Hess GN-Cambrian E-House*

Hess Corp. hired Intermountain to produce a lease automatic capture and transfer (LACT) unit, which is a structure that contains piping, automation, lighting, variable frequency drives, and transformers.

An LACT unit is used in the transfer of the custody of material that comes out of the ground, such as gas or oil, to a distribution system. The LACT unit was the last stop before oil or gas was transported offsite to the pipeline. As the oil or gas left the station, two separate systems would monitor the oil flow from the operator to the landowner. At the end of the month, the landowner and operator would reconcile their two systems for payment.

Intermountain encountered issues in manufacturing the LACT unit similar to those it encountered with the Whiting SWD skid. *See*

[*28] *infra* pp. 28–29. These issues included the enclosed area and classified and nonclassified environments.

Intermountain provided documentation completed during the Hess GN-Cambrian E-House's production. Intermountain completed an engineering checklist for the Hess E-House. The checklist shows the E-House was approved for manufacturing on July 3, 2014, less than a month after the June 6, 2014, order. The checklist also shows that "complete electrical drawing[s]" were "provided by [the] customer." Additionally, the pre-production review is marked "NA" because it was a "repeat job." Intermountain also completed a Production Detail Report for the Hess E-House. The document also indicates that the source of the project was 209694-1-1, a previous Intermountain project. This document shows 6.05 hours for setup and 527.41 hours for production. The hours logged for engineering were 0.02.

E. *Project 210464-1-1: Whiting Saltwater Disposal Skid*

In 2014, Whiting Petroleum Corp. (Whiting) was developing an oil extraction operation in North Dakota. The oil extraction process produces both oil and water. The water is a briny mixture of salt, hydrocarbons, heavy metals, and other contaminants (saltwater). Oil extractors use saltwater disposal (SWD) pump systems to separate the saltwater from the oil. To complete its project, Whiting needed a turnkey, prefabricated, automated pumping system to remove saltwater from the oil they extract. The system needed to be able to withstand harsh winters and summers in North Dakota.

Whiting hired Intermountain to produce an SWD skid. Whiting hired Intermountain, in part, because of Intermountain's shorter lead times. Whiting wanted the skid as fast as possible because its pipeline was already in place and only needed the SWD skid to complete the project. Intermountain provided Whiting with a quote for the project and did not express uncertainty about the feasibility of manufacturing the skid.

Environmental conditions in North Dakota necessitated adjustments to the design of the SWD skid. Typically, the various components of an SWD system are separate and exposed to the open air. The harsh winters of North Dakota necessitated enclosing the components in a single space where workers could maintain the system away from the freezing cold. Because SWD systems transfer explosive gases or liquids, any leak would be an immediate hazard. Additionally,

[*29] housing the electrical equipment in the same unit poses an explosion risk in the event of a leak or electrical arc. At the time Intermountain began this project, no comparable product existed in the industry.

Intermountain went through multiple iterations of the design before completing the project. Intermountain integrated exhaust fans and gas sensors into the design to detect and mitigate gas leaks. Intermountain also sealed off a portion of the interior from gas, with that sealed portion referred to as the "classified" side. Cables travelling between the classified and nonclassified sides had to be sealed and correctly sized to prevent gas from leaking between the sides. During the design process, Whiting requested that the pump be able to draw material out of a containment sump. Intermountain's engineer proposed a pump that would be a "solution for this application" because he had "used these pumps in other SWD locations for this very reason."

Intermountain also designed an interior crane system to haul bag filters out. As the oil ran through the system, bag filters would collect debris. Once full, the bags would be extremely heavy and would require the use of a crane to remove. The installation of a crane would also facilitate workers' removing pumps. To solve these problems, Intermountain designed a crane mounted on an I-beam that ran the length of the structure.

Once completed, the SWD skid was too large to load onto a truck within Intermountain's facilities. Intermountain hoisted the unit with a crane, which required careful planning to complete. The unit contained asymmetrical loads which gave it a unique center of gravity. As the weight of an object with asymmetrical loads increases, so does the risk of it bending. Even a small bend could result in permanent damage to the electrical or pumping systems. The record in this case does not show hours recorded on this project.

F. *Project 210554-1-1: Whiting E-House*

Whiting hired Intermountain to produce a modular steel e-house for a power distribution center to be placed in service at Whiting's North Antelope Rochelle Mine. The Whiting e-house followed what Intermountain called a "standard building design" and was based on an existing design. Intermountain's design needed to comply with Colorado state regulations.

[*30] Intermountain's records show most of the employee hours were spent fabricating and assembling the e-house. Intermountain's records show 3.83 hours of engineering, 40.44 hours of fabrication, 41.06 hours of final assembly, 6.72 of laser cutting, 17.45 of painting, and 5.25 of testing.

G. *Project 208277-2-1: Whiting Dual 500 HP Stage Loader VFD Controller*

Whiting also hired Intermountain to design and build a stage load pump VFD controller. This device allows the client to control the speed of the belt system transporting coal out of a mine. This was a small subcomponent to be included in a product sold to the final customer.

The record shows that engineers worked on the project. Intermountain's internal records for this project show 3.52 hours of engineering, 28.61 hours of fabrication, 88.8 hours of final assembly, 11.35 hours of painting, and 0.02 hours of testing.

H. *Project 024649-1-1: Morgantown Electrical Controller*

Project 024649-1-1, the Morgantown Electrical Controller, was the repair of an electrical controller for Morgantown Machine & Hydraulics of Utah (Morgantown). The project focused on developing an isolated tailpiece on a longwall system that could move separately on the CAT tracks with the other components. Intermountain worked with Morgantown on the project. Morgantown focused on the CAT track hydraulics and Intermountain was tasked with electrical controls and automation.

The record shows the project had 25.1 repair hours with a total cost of $4,533.93. No other type of time, such as engineering or testing, was recorded.

I. *Project 206901-1-1: North Antelope Flash Protection Door*

Project 206901-1-1, the North Antelope Flash Protection Door project, was Intermountain's development of an arc flash door. Powder River Coal, LLC, purchased a custom-designed arc flash door from Intermountain to use in the North Antelope Rochelle Mine. Powder River Coal is a subsidiary of Peabody Energy, one of the largest coal miners in the United States.

[*31] An arc flash is a sudden electrical discharge that occurs when a switch is shut off. Such a flash can cause an explosion if flammable gases are present. Arc flash doors were custom designed to prevent blowouts and provide paths of least resistance away from operators in the event of a flash. Intermountain had previously designed equipment to address arc flashes.

Intermountain's internal records show 19.24 hours of laser cutting and 4.58 hours of painting. No hours were recorded for engineering or testing the product.

J. *Project 69545: Minero Bolero Mine Transformer*

Project 69545, the Minero Bolero Mine Transformer, was a transformer for a power center that Intermountain manufactured for the Minero Bolero Mine (Minero Bolero). Intermountain built multiple power centers for Minero Bolero. The record before us does not contain much information about this project.

The limited records show that Intermountain recorded 39.98 hours for fabrication, 127.4 hours for final assembly, and 23.57 hours for painting. No hours were recorded for engineering or testing.

K. *RD-0000: The GLT 500*

In 2011, Intermountain started RD-0000, a proprietary research project to create a ground monitor used in mining operations, which became known as the GLT 500.[5] Most devices used to connect electric devices to the electrical source include a safety ground, which reduces the risk of electrocution. The ground monitor constantly monitors the safety ground signal to minimize the likelihood of electrocution. If the ground monitor does not detect a valid ground or is not sure there is one, the monitor will shut the power off for safety. The record in this case shows costs but does not show hours recorded on this project.

1. *Design Process*

Intermountain started with a clean sheet, evaluating different design approaches to create the GLT 500. Ground monitors can sometimes trigger "nuisance trips," which are mistaken or unnecessary interruptions of power to the circuit breaker that can become expensive

[5] Mr. Curtis, the leader of Intermountain's internal R&D department, created the acronym "GLT," which stands for ground lock technology.

[*32] for mine operators. From an electrical engineering perspective, Intermountain had to consider the method it would use to configure the circuit board of the GLT 500. Intermountain also had to consider what the correct combination of electrical and mechanical engineering both to interrupt power when necessary and to minimize nuisance trips.

The intent behind the design of the GLT 500 was to create a device with several first-of-its-kind functionalities. The GLT 500 had a sensor that monitored the flow of an electrical current. It also had a latching indicator breaker function, which provided an operator with information about the nature of an electrical failure. It also had a bicolor indicator light, whereas all prior systems used a single-color light. The light would turn red if there was a problem and would be green if it was functioning correctly. It also had an accessory port that connected to other technology to allow remote observation of ground monitoring, a function not present in prior ground monitoring systems. Mr. Curtis received a patent for the accessory port technology.

In evaluating alternative designs for the GLT 500, the electrical and mechanical engineering teams used models, simulations, and calculations to evaluate alternatives. The engineering team used these simulations, modeling, and calculations to develop the testing rigs required to evaluate alternatives.

2. *Testing*

The first test of GLT 500 showed it lasted six months. The device failed because dust from the mine settled into the front panel, causing the switches to become unreliable. In response, Intermountain redesigned the switches to be airtight, which improved durability.

Intermountain also tested for electrical safety. Intermountain identified the presence of electrical leakage and arcing, which posed a significant risk of electrocution. To address the issue, Intermountain radically redesigned the GLT 500, mechanically and electrically, to improve isolation of the circuits. This required working in the laboratory with an extremely high voltage generator. Intermountain also conducted on-site testing to minimize nuisance tripping in the GLT 500.

L. *RD-0009: The GMS 504-DZ*

In 2012, Intermountain started RD-0009, a proprietary research project to create a software-based product, GMS 504-DZ. Intermountain's goal was to create a modern ground monitor that would

[*33] better avoid nuisance trips and contain more innovative and reliable features. Mr. Curtis helped engineer GMS 504-DZ and directly supervised the mechanical and electrical engineers on the project. Mr. Curtis also directly supervised interns who spent close to 100% of their time dedicated to the GMS 504-DZ project. These interns included Traz Wayman, a Brigham Young University student in electrical engineering, and Josh Erramouspe, a mechanical engineering student. Before completing the project, Mr. Curtis had confidence, but was not certain, that he could design a product with the features and functions required to complete this project. GMS 504-DZ acted as four different ground monitors, all working together. It used different test signals to avoid nuisance tripping, a feature not contained in the GLT 500.

Intermountain designed the software and tested it throughout different prototypes. Once the design process yielded a more complete product, Intermountain subjected the hardware to extreme conditions to simulate the conditions it would be exposed to in a mine. Mr. Curtis also created test procedures to test all possible functions of the software. Once the product was complete, Intermountain sought and obtained a patent for the technology. The record in this case shows costs but does not show hours recorded on this project.

OPINION

I. *Burden of Proof*

Generally, the Commissioner's determinations in a Notice of Deficiency are presumed correct, and taxpayers bear the burden of proving otherwise. Rule 142(a); *Welch v. Helvering*, 290 U.S. 111, 115 (1933). Consistent with that general statement, taxpayers bear the burden of proving their entitlement to deductions or credits disallowed by the Commissioner. *Feigh v. Commissioner*, 152 T.C. 267, 270 (2019) (first citing *INDOPCO, Inc. v. Commissioner*, 503 U.S. 79, 84 (1992); and then citing *Segel v. Commissioner*, 89 T.C. 816, 842 (1987)).

II. *Section 41 Credit for Research and Development*

Section 41 allows taxpayers a credit for increasing research activities. The credit is equal to 20% of the excess of a taxpayer's qualified research expenses (QREs) for the taxable year over the base amount. I.R.C. § 41(a)(1). There are two methods for calculating the base amount: the regular method and the alternative simplified method. I.R.C. § 41(c)(2), (5). Intermountain used both.

[*34] A. *Base Amount*

Under the regular method, the base amount is a minimum of fifty percent of the QREs for the credit year. I.R.C. § 41(c)(2). It is the product of "the fixed-base percentage" and "the average annual gross receipts of the taxpayer for the 4 taxable years preceding the taxable year for which the credit is being determined." I.R.C. § 41(c)(1). Because Intermountain did not have QREs for a taxable year beginning before December 31, 1983, its fixed-base percentage is three percent for each of the first five taxable years for which it had qualified research, increasing each year thereafter that Intermountain had QREs. *See* I.R.C. § 41(c)(3)(A), (B)(ii)(I). The maximum fixed-base percentage is sixteen percent. I.R.C. § 41(c)(3)(C).

Under the alternative simplified method, the credit is fourteen percent of the QREs that exceed fifty percent of the average QREs for the three taxable years preceding the taxable year for which the credit is being determined. I.R.C. § 41(c)(5)(A). If there are no QREs for any of the three preceding years, the credit is six percent of the QREs for the taxable year. I.R.C. § 41(c)(5)(B).

Intermountain used the alternative simplified method for 2012 and 2013. It used the regular method for 2014 and 2015.

B. *Qualified Research Expenses*

QREs consist of in-house research expenses and contract research expenses. I.R.C. § 41(b)(1) and (2)(A). In-house research expenses are (1) "any wages paid or incurred to an employee for qualified services performed by such employee" and (2) "any amount paid or incurred for supplies used in the conduct of . . . qualified research." I.R.C. § 41(b)(2)(A)(i) and (ii). Qualified services are defined as either (1) "engaging in qualified research" or (2) "engaging in the direct supervision or direct support of qualified research." I.R.C. § 41(b)(2)(B). Direct support of qualified research includes direct support of either the person engaging in qualified research or the person directly supervising the qualified research. Treas. Reg. § 1.41-2(c)(3). Generally, wage expenses are considered in-house research expenses to the extent the wages were paid for qualified services. I.R.C. § 41(b)(2)(A)(i). If at least 80% of the services an employee performs are qualified services, a taxpayer may include 100% of the wages paid to the employee as in-house research expenses. Treas. Reg. § 1.41-2(d)(2).

[*35] C. *Qualified Research*

Qualified research must pass four statutory tests and not otherwise be specifically excluded by section 41(d)(4). I.R.C. § 41(d)(1). First, expenditures connected with the research must be eligible for treatment as expenses under section 174, i.e., the "section 174 test." I.R.C. § 41(d)(1)(A). Second, the research must be undertaken for the purpose of discovering technological information, i.e., the "technological information test." I.R.C. § 41(d)(1)(B)(i). Third, the taxpayer must intend that the information to be discovered be useful in the development of a new or improved business component of the taxpayer, i.e., the "business component test." I.R.C. § 41(d)(1)(B)(ii). Fourth, substantially all of the research activities must constitute elements of a process of experimentation for a purpose relating to a new or improved function, performance, reliability, or quality, i.e., the "process of experimentation test." I.R.C. § 41(d)(1)(C), (3). These tests apply separately to each business component. I.R.C. § 41(d)(2)(A).

Exclusions apply. Research is not qualified research to the extent it relates to: (1) research after the beginning of commercial production of the researched business component; (2) research related to the adaptation of an existing business component to a particular customer's requirement or need; (3) research related to the reproduction of a particular business component; (4) any market research, routine data collection, or routine or ordinary testing or inspection for quality control; (5) research conducted outside the United States, its territories, or its possessions; or (6) any research in the social sciences, arts, or humanities. I.R.C. § 41(d)(4)(A)–(C), (D)(iii)–(v), (F), (G).

1. *The Section 174 Test*

The section 174 test requires research expenditures to be eligible for treatment as expenses under section 174. I.R.C. § 41(d)(1)(A). Section 174 operates as a narrow, elective exception to the general capitalization rules. I.R.C. §§ 174(a), 263(a)(1), 263A(c)(2). Section 174(a) allows a taxpayer to elect a current deduction for research and experimental expenditures that are paid by the taxpayer during the taxable year in connection with their trade or business. I.R.C. § 174(a)(1); Treas. Reg. § 1.174-2. Research and experimental expenditures are research and development costs in the experimental or laboratory sense and generally include all costs incident to the development or improvement of a product. Treas. Reg. § 1.174-2(a)(1).

[*36] The regulations define research and experimental expenditures as "expenditures incurred in connection with the taxpayer's trade or business which represent research and development costs in the experimental or laboratory sense." *Id.* Research and development costs in the experimental or laboratory sense are for "activities intended to discover information that would eliminate uncertainty concerning the development or improvement of a product. Uncertainty exists if the information available to the taxpayer does not establish the capability or method for developing or improving the product or the appropriate design of the product." *Id.*

We apply a two-step test to determine whether a taxpayer's activities constituted research and development within the meaning of section 174. For there to be experimental expenditures, the taxpayer must show (1) that it does not already have information that can address a capability or method for improving the product or design of the product (uncertainty exists) and (2) its activities were meant to eliminate those uncertainties. *Union Carbide Corp. & Subs. v. Commissioner*, T.C. Memo. 2009-50, 97 T.C.M. (CCH) 1207, 1255, *aff'd*, 697 F.3d 104 (2d Cir. 2012). If we conclude that the taxpayer fails the section 174 test at "the level of [the] product" as a whole, the taxpayer may still satisfy the test "at the level of the component or subcomponent." Treas. Reg. § 1.174-2(a)(5).

In the first step, the taxpayer must show that the information objectively available to it did not establish the appropriate design of the product. Treas. Reg. § 1.174-2(a)(1); *see also Max v. Commissioner*, T.C. Memo. 2021-37, at *29. If such information was not available to the taxpayer with respect to establishing either the capability, method, or appropriate design, then uncertainty existed. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255; Treas. Reg. § 1.174-2(a)(1).

In determining whether uncertainty existed, we examine the information objectively available to the taxpayer, rather than the taxpayer's subjective understanding of that information. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255 ("Whether an uncertainty exists is an objective test that depends on the information available to the taxpayer."). Expenditures that are paid after the elimination of uncertainty are not research and development expenditures. Treas. Reg. § 1.174-2(a)(2). Furthermore, it bears emphasis that uncertainty related to a subcomponent does not necessarily render the appropriate design of the product as a whole uncertain. *Betz v. Commissioner*, T.C. Memo. 2023-84, at *76 (determining that a taxpayer failed to show objective

[*37] uncertainty as to the design of the product as a whole because the taxpayer would not have to scrap the entire product if it did not work).

In the second step, if uncertainty existed, the taxpayer must show that it undertook investigative activities that were "intended to discover information that would eliminate uncertainty." Treas. Reg. § 1.174-2(a)(1); *see Max*, T.C. Memo. 2021-37, at *30–31 (citing *Mayrath v. Commissioner*, 41 T.C. 582, 590 (1964), *aff'd*, 357 F.2d 209 (5th Cir. 1966)) (requiring the taxpayer to show it undertook investigative activities because the purpose of section 174 was to limit deductions to expenditures of an investigative nature). The resolution of this uncertainty does not necessarily require experimentation. *See Little Sandy Coal Co. v. Commissioner*, T.C. Memo. 2021-15, at *36, *aff'd*, 62 F.4th 287 (7th Cir. 2023). We have previously held that a meeting or email soliciting further information and specifications is an investigative activity within the meaning of section 174. *See Betz*, T.C. Memo. 2023-84, at *80, *89. However, performing basic calculations on available data is not an investigative activity because the taxpayer already has all the information necessary to address what was unknown. *Id.* at *84, *87 (finding that performing calculations to determine duct size based on airflow was not an investigative activity); *Max*, T.C. Memo. 2021-37, at *30 (finding that while information was subjectively unknown to the taxpayer with respect to the appropriate design of a component, the taxpayer "already ha[d] the information necessary to address that unknown"). A taxpayer cannot carry its burden to show that it engaged in investigative activities merely by presenting an issue and eventual solution. *See Betz*, T.C. Memo. 2023-84, at *86. Instead, the taxpayer must show it actually conducted investigatory activities. *See id.*

The section 174 test also includes one important limitation. Expenditures paid or incurred for "ordinary testing or inspection of materials or products for quality control (quality control testing)" are not deductible under section 174. Treas. Reg. § 1.174-2(a)(6)(i). Quality control testing includes "testing or inspection to determine whether particular units of materials or products conform to specified parameters" but "does not include testing to determine whether the design of the product is appropriate." *Id.* subpara. (7).

a. *Supply Expenses*

Section 174 limits deductions to "'expenditures of an investigative nature expended in developing the *concept* of a model or product', as

[*38] opposed to the construction or manufacture of the product itself." *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255 (alteration in original) (quoting *Mayrath*, 41 T.C. at 590); *accord Kollsman Instrument Corp. v. Commissioner*, T.C. Memo. 1986-66, 51 T.C.M. (CCH) 463, 466 (distinguishing between nondeductible production activities and deductible research activities), *aff'd*, 870 F.2d 89 (2d Cir. 1989). Consequently, a deduction under section 174 is generally not available with respect to costs of production, and claimed QREs incurred in the actual production of a product typically fail the section 174 test. *Max*, T.C. Memo. 2021-37, at *30.

The regulations contain an exception for costs incurred in the construction of prototypes or "pilot models," which are defined as "any representation or model of a product that is produced to evaluate and resolve uncertainty concerning the product." Treas. Reg. § 1.174-2(a)(4); *see Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *38–39. The regulations note that "a fully-functional representation or model of the product or . . . a component of the product" can still be a pilot model if produced to evaluate and resolve uncertainty. Treas. Reg. § 1.174-2(a)(4). For a product to qualify as a pilot model exception, the taxpayer must show that (1) uncertainty existed (i.e., an objective lack of information) as to capability, method, or appropriate design of a product, (2) it constructed "a representation or model" of the product, and (3) its purpose in constructing the representation or model was to "evaluate and resolve uncertainty" about capability, method, or appropriate design. *Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *41 ("[T]he classification of a product as a pilot model turns on the taxpayer's purpose in producing it."); *see also Little Sandy Coal Co. v. Commissioner*, 62 F.4th at 303 ("[T]he creator's intent matters."). Once objective uncertainty is eliminated with respect to the underlying product, any further costs of production do not qualify under section 174. *See* Treas. Reg. § 1.174-2(a)(1), (11) (ex. 3).

Although Intermountain does not argue in its Posttrial Briefs that its products are pilot models, it raised the issue in both its Pretrial Memorandum and its Response to the Commissioner's Motion for Partial Summary Judgment. As a general matter, an argument not made by a party on brief is deemed abandoned. *Mendes v. Commissioner*, 121 T.C. 308, 312–13 (2003). In a similar case, *Betz*, T.C. Memo. 2023-84, at *73, the taxpayers initially asserted in their Pretrial Memorandum that a project for which they claimed the section 41 credit was a pilot model with qualifying section 174 costs. While the taxpayers in that case did not explicitly raise the issue on brief, we nevertheless

[*39] found that the taxpayers' "generalized contentions that the supply costs were QREs necessarily raises this issue for decision." *Betz*, T.C. Memo. 2023-84, at *73 (citing *Purple Heart Patient Ctr., Inc. v. Commissioner*, T.C. Memo. 2021-38, at *35 n.10 (questioning taxpayer's failure to explicitly brief issue but "nonetheless" addressing issue as "entwined" with other issues properly raised by taxpayer)). Intermountain argued on brief that supply costs were incurred "often at the outset of a project, before designs were final and before the business components reached commercial viability." We will view Intermountain's generalized contentions as sufficiently raising the pilot model issue for decision.

To satisfy the section 174 test with respect to pilot models, Intermountain must show that supply QREs related to the cost of producing pilot models. While the regulations note that a fully functional representation or model can qualify as a pilot model, the taxpayer must establish that its purpose in producing that representation or model was to evaluate and resolve uncertainty about the product. Treas. Reg. § 1.174-2(a)(1), (4); *cf. Natkunanathan v. Commissioner*, T.C. Memo. 2010-15, 99 T.C.M. (CCH) 1071, 1074 ("Expenditures made to develop and deliver functional products for use by customers do not usually constitute 'research and development * * * in the experimental or laboratory sense.'" (quoting Treas. Reg. § 1.174-2(a)(1)), *aff'd*, 479 F. App'x 775 (9th Cir. 2012). Intermountain has failed to make such a showing.

The record does not support the contention that Intermountain's projects were pilot models. Like those of the taxpayers in *Betz*, Intermountain's projects did not create models, but rather the "final product itself." *Betz*, T.C. Memo. 2023-84, at *74 (citing *Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *42–43). In Intermountain's project process, "prototypes designs" are mentioned only in proprietary product development. Additionally, the prototype is a 3–D model completed in drafting software. Then the 3–D design is turned into a 2–D drawing. However, on brief, Intermountain did not argue the proprietary project supply costs for the software or creation of these 3–D models apart from the time spent by the engineers to input these calculations, which would fall under wage QREs.

The record shows that in Intermountain's general process, testing of the products as a whole occurred either at the facility before shipping or at the customer's facility after installation. Although Intermountain

[*40] conducted early-stage testing for certain projects, they have not pursued this argument on brief. *See Mendes*, 121 T.C. at 312–13.

b. *Wages*

As a category of expenditure, wages are potentially deductible under section 174 if paid or incurred for research and development within the meaning of section 174. As with supply costs, Intermountain must show that (1) information was not available to Intermountain establishing the appropriate design of the various projects it created and (2) Intermountain undertook investigative activities intended to discover such information.

The Commissioner argues that the wages Intermountain paid to its production employees were not for qualified research. While the Commissioner acknowledges that production employees may have identified errors requiring a revision in design, he argues that they did not work to eliminate uncertainty. The Commissioner acknowledges that wages paid to production employees are not categorically excluded from the denominator of the substantially all equation. *See Little Sandy Coal Co. v. Commissioner*, 62 F.4th at 305–07. Nevertheless, the Commissioner maintains that Intermountain's production employees' activities do not pass the section 174 test. Whether Intermountain's production or nonproduction employees aided in a process of experimentation to resolve qualifying uncertainty is a fact-specific inquiry that we will evaluate project by project.

2. *The Technological Information Test*

The technological information test requires that the research be undertaken for the purpose of discovering information that is technological. I.R.C. § 41(d)(1)(B)(i). Information is technological if it "fundamentally relies on principles of the physical or biological sciences, engineering, or computer science." Treas. Reg. § 1.41-4(a)(4). Therefore, discovery of information related to the social sciences, arts, or humanities would not satisfy this test. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255.

3. *The Business Component Test*

The business component test requires that the taxpayer intend that the information to be discovered will be useful in the development of "a new or improved business component of the taxpayer." I.R.C. § 41(d)(1)(B)(ii). A business component is "any product, process,

[*41] computer software, technique, formula, or invention which is . . . held for sale, lease, or license, or . . . used by the taxpayer in [its] trade or business." I.R.C. § 41(d)(2)(B). To be useful within the meaning of this test, the research need only provide some level of functional improvement to the taxpayer. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255.

4. *The Process of Experimentation Test*

Finally, section 41 requires that substantially all the research activities constitute elements of a process of experimentation for a qualified purpose. I.R.C. § 41(d)(1)(C). A process of experimentation is a "process designed to evaluate one or more alternatives to achieve a result where . . . the appropriate design of that result, is uncertain as of the beginning of the taxpayer's research activities." Treas. Reg. § 1.41-4(a)(5)(i). The requisite uncertainty under this test is essentially identical to the uncertainty required by the section 174 test. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255–56. Unlike the section 174 test, however, this evaluative process must follow the scientific method. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1256.

The substantially all requirement is satisfied if "80 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." Treas. Reg. § 1.41-4(a)(6). 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 [qualified purpose], so long as these remaining research activities satisfy the [section 174 test] and are not otherwise excluded under section 41(d)(4)." *Id.* Therefore, the numerator of the relevant fraction is all research activities that constitute an element of a process of experimentation for a qualified purpose. *Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *40; Treas. Reg. § 1.41-4(a)(6). The denominator is all research activities that meet the section 174 test that are not covered by one of the statutory exclusions. *Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *40; Treas. Reg. § 1.41-4(a)(6). Intermountain bears the burden of providing sufficient information to demonstrate that the substantially all fraction equals or exceeds 80%. *See Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *43–44.

The final part of the process of experimentation test requires that the activities be for a qualified purpose as defined in section 41(d)(3).

[*42] Qualified research includes research that is related to (1) a new or improved function, (2) performance, or (3) reliability or quality. *Id.* Research related to style, taste, cosmetic, or seasonal factors is not for a qualified purpose. *Id.*

D. *Shrink-Back Rule*

If a business component fails any part of the four-part statutory test, we may apply the tests to a subset of the product (shrink-back rule). Treas. Reg. § 1.41-4(b)(2). The shrink-back rule instructs us to reapply the four-part statutory test to the business component at its most significant subset of elements. *Id.* If that subset of elements again fails, we generally shrink back to a more granular subset of the business component until either (1) a subcomponent satisfies the test or (2) the most basic level of the component fails to satisfy the test. *Id.* When a component fails, we have previously applied this rule to an issue that a taxpayer encounters in the design process when the issue relates to an identifiable subcomponent. *See, e.g.*, *Betz*, T.C. Memo. 2023-84, at *81. As noted, an identical test applies if a business component fails the section 174 test. *See* Treas. Reg. § 1.174-2(a)(5).

If we determine that any trial project fails a particular test, Intermountain contends that we can apply the shrink-back rule by relying on Intermountain's time tracking and job costing data. Intermountain presents two options to use the data, by discipline or by design phase. *See Phx. Design Grp., Inc.*, T.C. Memo. 2024-113, at *31. Intermountain's first suggestion to apply the shrink-back rule by discipline suggests that, if the project fails to qualify as a whole, we could narrow the scope of our review to the mechanical systems or electrical systems. If this secondary level fails, the shrink-back rule would direct us to determine the next most significant subset of the business component.

E. *Substantiation*

Section 6001 requires that taxpayers keep records in compliance with the rules and regulations prescribed by the Secretary of the Treasury. Accordingly, taxpayers are required to "keep such permanent books of account or records . . . as are sufficient to establish the amount of gross income, deductions, credits, or other matters required to be shown" on a tax return. Treas. Reg. § 1.6001-1(a). With respect to the research credit, the taxpayer specifically "must retain records in sufficiently usable form and detail to substantiate that the expenditures

[*43] claimed are eligible for the credit." Treas. Reg. § 1.41-4(d). To substantiate wages paid or incurred for qualified services, the taxpayer need not necessarily maintain and produce contemporaneous time-tracking records for its employees. *See Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1268; *Fudim v. Commissioner*, T.C. Memo. 1994-235, 67 T.C.M. (CCH) 3011, 3012 (accepting "testimony and other evidence in the record" as basis for *Cohan* rule estimate of time spent in performing qualified services (citing *Cohan v. Commissioner*, 39 F.2d 540 (2d Cir. 1930))).

However, we do not apply the *Cohan* rule to estimate wages paid or incurred if the taxpayer fails to make the threshold showing that a particular employee performed activities that constituted qualified services with respect to a business component. *See Shami v. Commissioner*, 741 F.3d 560, 568 (5th Cir. 2014) ("[T]he *Cohan* rule is not implicated unless the taxpayer proves that he is entitled to some amount of tax benefit[;] [i]n the context of the § 41 credit, a taxpayer would do so by proving that its employee performed some qualified services."), *aff'g in relevant part* T.C. Memo. 2012-78.

If a business component as a whole fails any of the four qualified research tests, the taxpayer must still show that a particular employee performed qualified services with respect to a particular subset of the component, in order to invoke *Cohan*. *See Eustace v. Commissioner*, T.C. Memo. 2001-66, 81 T.C.M. (CCH) 1370, 1372, 1374 (rejecting taxpayers' attempt to invoke *Cohan* rule when they lacked "the substantiation necessary to tie salaries to activities at the subcomponent level" and merely "delineated the employees and activities" believed to qualify for the credit), *aff'd*, 312 F.3d 905 (7th Cir. 2002).

F. *Exclusions*

Certain activities do not qualify for the research credit. The Commissioner asserts that Intermountain's activities fall under one of three categories of excluded activities. First, the Commissioner argues that Intermountain's activities constitute research related to either the adaptation or the duplication of an existing business component. I.R.C. § 41(d)(4)(B) and (C). Second, the Commissioner argues that Intermountain's activities constitute routine or ordinary testing or inspection for quality control. *Id.* subpara. (D)(v). Or third, the Commissioner argues that Intermountain's activities constitute funded research. *Id.* subpara. (H). A finding that any one of these exclusions applies would disqualify a project's expenses from the research credit.

[*44] 1. *Adaptation or Duplication*

As to the first issue, the Commissioner asserts that Intermountain is doing repeat work with minor alterations. He observes that many project records note projects as "repeat job" or that projects look strikingly similar to one another.

2. *Routine or Ordinary Testing*

As to the issue of routine or ordinary testing, caselaw makes a distinction between experimentation and tinkering. In *Eustace v. Commissioner*, 312 F.3d at 907, the U.S. Court of Appeals for the Seventh Circuit distinguished using the scientific method from making minor alterations or routine testing. In this case, the Commissioner observes that Intermountain ran the same battery of standard tests on projects for which it claimed the research credit and for projects where it did not claim the research credit. The Commissioner asks us to conclude that applying the same tests indicates that the projects for which a credit was claimed were not qualified research, but mere ordinary testing. Of course, even a newly developed product may need to pass routine or ordinary tests to confirm that it is performing as intended.

3. *Funded Research*

Funded research is generally ineligible for the research credit. Research is considered funded when the person doing the research retains no substantial rights in the research. Treas. Reg. § 1.41-4A(d)(2).[6] The regulations provide two factors that are relevant in determining whether research is funded. First, "[a]mounts payable under any agreement that are contingent on the success of the research and thus considered to be paid for the product or result of the research . . . are not treated as funding." Treas. Reg. § 1.41-4A(d)(1); *see also Fairchild Indus., Inc. v. United States*, 71 F.3d 868, 870 (Fed. Cir. 1995) (describing exclusion as allocating the credit "to the person that bears the financial risk of failure of the research"). Second, "[i]f a taxpayer performing research for another person retains substantial rights in the research under the agreement providing for the research," that research is likewise not treated as funded to the extent of the payments for the

[6] Although Treasury Regulation § 1.41-4A is captioned "Qualified research for taxable years beginning before January 1, 1986," it is incorporated by reference into the regulations applicable for the years in issue by Treasury Regulation § 1.41-4(c)(9).

[*45] research. Treas. Reg. § 1.41-4A(d)(3); *see also* Treas. Reg. § 1.41-2(a)(3).

We determine the relative rights of the parties by looking to the terms of the contract between them. *Tangel v. Commissioner*, T.C. Memo. 2021-1, at *11; *see also Lockheed Martin Corp. v. United States*, 210 F.3d 1366, 1376 (Fed. Cir. 2000) (stating that application of the exclusion "must be determined by reference to the research agreements"). A taxpayer retains no substantial rights in research performed "under an agreement that confers on another person the exclusive rights to exploit the results of the research." Treas. Reg. § 1.41-4A(d)(2). Similarly, a taxpayer retains no substantial rights in research "if the taxpayer must pay for the right to use the results of the research." *Id.* subpara. (3)(i); *cf. Lockheed Martin Corp.*, 210 F.3d at 1375 ("The right to use the research results, even without the exclusive right, is a substantial right."). Finally, "[i]ncidental benefits" to the taxpayer from performing research, such as "increased experience in a field of research," are not substantial rights. Treas. Reg. § 1.41-4A(d)(2). As with other elements of the research credit, Intermountain bears the burden of showing that it retained substantial rights in the results of any research performed under the contracts. *See Dynetics, Inc. & Subs. v. United States*, 121 Fed. Cl. 492, 523 (2015).

III. *The Qualification of the Trial Projects as Qualified Research*

Intermountain contends that it faced uncertainty as to the appropriate design of each of its trial projects because the appropriate design of each project could not be established until construction was complete. Intermountain claims this uncertainty continued because its manufacturing employees or engineers would discover design flaws during the manufacturing process, which might require reworking a design. In general, Intermountain resolved these uncertainties following its seven-stage design process. Intermountain alleges that when faced with an issue in a later design stage, its engineers would revert to earlier stages to resolve the issue, creating an iterative process that mirrors the scientific method.

As a general matter, we have previously held in a factually analogous case that section 174 uncertainty does not exist merely by the prospect of future revisions to the design of a product. *See Phx. Design Grp., Inc.*, T.C. Memo. 2024-113, at *33. The regulations and our caselaw recognize a distinction between uncertainty as to the design of the whole system (its basic design specifications) and uncertainty as to the design

[*46] of a particular component. Treas. Reg. § 1.174-2(a)(5); *see also Betz*, T.C. Memo. 2023-84, at *76. The mere possibility of altering the design in later stages does not itself establish that uncertainty remained. *See Betz*, T.C. Memo. 2023-84, at *76; *Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *53. These subsequent revisions may introduce some uncertainty, but the scope of the uncertainty is determined from the particular facts and does not necessarily extend to the entire system. *See Betz*, T.C. Memo. 2023-84, at *76; *Little Sandy Coal Co.*, T.C. Memo. 2021-15, at *53. The fact that revisions may have been required does not necessarily lead to the conclusion that uncertainty remained. Rather than reach a blanket conclusion, we will evaluate each project separately.

We similarly reject an argument made by Intermountain that it satisfied the process of experimentation test by directing the Court to its general design process. "Merely connecting an activity to a larger plan that may resemble the scientific method does not satisfy the process of experimentation test." *Phx. Design Grp., Inc.*, T.C. Memo. 2024-113, at *33. While the design process as framed by Intermountain may appear similar to the scientific method, Intermountain's blanket argument is not sufficient for us to find that Intermountain employees engaged in a process of experimentation. Instead, we will focus on the activities of the Intermountain employees, project by project.

Lastly, Intermountain argues that it satisfied the technological information test for all of its projects because its general process is technological. On brief, Intermountain argues that its trial and error process used principles of electrical and mechanical engineering, and physics. It concludes there "was no evidence that [its] systematic process was based on aesthetics, social sciences, involved only survey research, or the humanities." On brief, the Commissioner addresses only the technological information test when addressing the four statutory tests for qualified research. Neither party separately addresses on brief the technological information test as applied to each project. Accordingly, we will direct our analysis on the remaining three tests as applied to each project.

We turn to each trial project to determine whether it entailed qualified research within the meaning of section 41.

[*47] A. *Project 20047X: Hillsboro Longwall Project*

The Hillsboro Longwall project satisfies the business component test. On brief, Intermountain observes that the Hillsboro Longwall project created a longwall system with entirely new functions and features that was sold to Hillsboro, thus satisfying section 41(d)(1)(B)(ii) and (2)(B). The Commissioner has pointed to no evidence tending to show that Intermountain's claimed credit for the Hillsboro Longwall project did not satisfy the business component test of section 41(d)(1) and (2).

Intermountain faced section 174 uncertainty during the Hillsboro Longwall Project but failed to carry its burden to establish which portions of wages related to resolving the uncertainty. The Hillsboro Longwall project consisted of various subprojects to create the longwall mining system. Several of these subprojects involved the design and creation of technologies that did not yet exist in the market. Intermountain had to design a longwall system that addressed specifications provided by the client, including a CAT track system, a monorail system that propelled itself, and a custom transformer system. Intermountain had not previously encountered these problems because it had not built an underground longwall system. Intermountain faced uncertainty.

The fact that Intermountain faced section 174 uncertainty during this project does not, however, mean that all expenses were related to the resolution of that uncertainty. Discerning which parts of the project relate to the resolution of uncertainty requires determining when Intermountain was and was not working to resolve an uncertainty. Intermountain argues that every phase relates to the resolution of uncertainty because manufacturing workers and engineers alike worked to identify and reconcile discrepancies between the design and the function of the product. The Commissioner argues that even if section 174 uncertainty existed, the record does not provide the Court with information necessary to discern which wages relate to the resolution of that uncertainty. We agree with the Commissioner.

Intermountain suggests different methods to shrink back the projects. First, Intermountain suggests crediting only those wages paid to its employees during the initial phase of the process, i.e., the first few months. Second, Intermountain suggests we divide costs on a department-by-department basis. But the engineering staff were not paid exclusively for the resolution of uncertainty. They did not track

[*48] their hours but estimated them after the fact. Additionally, the record has conflicting evidence regarding the hours worked by the employees on the project. Therefore, the record does not provide us with sufficient proof to determine the actual hours worked on credit-qualifying projects. For this reason, Intermountain has not satisfied its evidentiary burden with respect to substantiating expenses for the Hillsboro Longwall project.

Lastly, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. To meet the "substantially all" requirement, at least 80% of the taxpayer's research activities for each business component, measured on a cost or other reasonable basis, must constitute a process of experimentation for a qualified purpose. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255; Treas. Reg. § 1.41-4(a)(6). But the record shows conflicting evidence regarding the activities conducted by Intermountain engineers and includes hours for only seven of the various subprojects. Therefore, we cannot find that 80% of Intermountain's activities on the Hillsboro Longwall project were part of a process of experimentation.

B. *Project 205662: Kearl Oil Sands Expansion Project*

1. *Funded Research*

The Kearl Oil Sands project is funded research and accordingly is excluded as qualified research. *See* I.R.C. § 41(d)(4)(H). Intermountain asserts broadly that it bore the financial risk of failed research in all its projects and retained substantial rights in all of its research. The Commissioner asserts that Intermountain retained no substantial rights in its research for ThyssenKrupp in the Kearl Oil Sands project, which Intermountain rejects. Treasury Regulation § 1.41-4A(d)(1)–(5) presents different scenarios, which, if satisfied, characterize research as funded. Under one such scenario, even if Intermountain bears the financial risk of loss in the event of failed research, its research is funded if it retains no substantial rights in the research. *Id.* subpara. (2).

The governing agreement between ThyssenKrupp and Intermountain vested all substantial rights in ThyssenKrupp. As a preliminary matter, the contract provided for the transfer of title to ThyssenKrupp upon successful completion of the first payment or delivery of the product. It also provided for the transfer of intellectual property in the work product. The agreement states that ThyssenKrupp

[*49] "shall remain the owner of all its intellectual and property rights" as to the work product, but "grants to [Intermountain] the right to use such intellectual and industrial property rights solely for the purpose of producing the Work and no other purpose." Intermountain is not allowed "to disclose to any third party or to use for any further project" the intellectual property used to produce the project. Further, Intermountain agreed that if "any of its personnel make any inventions, discoveries, or improvements patentable or unpatentable, resulting from their activities under the Purchase order . . . [Intermountain] shall promptly disclose those Inventions to [ThyssenKrupp] in writing."

On brief, Intermountain claims that relinquishment of intellectual property rights is not equivalent to relinquishment of substantial rights for the purpose of the funded research exception. Caselaw instructs us differently. In considering contract terms in a similar case, the Court of Federal Claims asked "how [the taxpayer] could have substantial rights in the results of the research, if it needed the [purchaser's] 'authorization' to use those results." *Dynetics, Inc. & Subs.*, 121 Fed. Cl. at 521.

The terms are even clearer in our case. In the agreement, Intermountain "assigns, and shall require its personnel to assign" any invention arising from the creation of the project. Intermountain grants to ThyssenKrupp,

> its affiliates and successors a perpetual, irrevocable, royalty-free, worldwide, transferable, nonexclusive license and licensing right under all its intellectual and industrial property rights, patents and know-how rights now or hereafter owned or controlled by [Intermountain] which cover any apparatus, article, process or composition used or produced in the use of the Work, including the right to erect, commission, use, sell, operate, maintain, repair, replace, reconstruct, re-make, alter, or modify the Work and all parts thereof or sell products thereof. The rights granted to [ThyssenKrupp] by [Intermountain] under this article shall be assignable by [ThyssenKrupp] to any party to whom [ThyssenKrupp] may transfer all or part of title to the Purchase Order.[143:589]

The agreement does not, as Intermountain suggests, apply only to inventions arising up to one year after the completion of the product for ThyssenKrupp. The cited text reads: "Inventions covered in this

[*50] section shall include those conceived during the term of the Purchase Order and within one (1) year thereafter." This does not limit the scope of the transfer of rights to one year after the completion of the work. Rather, it expands the scope of the transfer of rights to any *ideas* conceived about the work up to one year after its completion. It is challenging to imagine what, if any, rights Intermountain retains in the work product at all. These terms transfer all substantial rights to ThyssenKrupp. As Intermountain retains no substantial rights in the project, the Kearl Oil Sands project is funded research and, therefore, excluded from the definition of qualified research.

2. *Qualified Research*

Even if the Kearl Oil Sands project was not excluded as funded research, it does not constitute qualified research for additional reasons.

On brief, Intermountain argues that the seven e-houses were created and sold to be integrated into a larger project for controlling the entire process for an oil sands removal project. On brief, the Commissioner addresses the business component test only when addressing the four statutory tests for qualified research. Accordingly, the Commissioner has pointed to no evidence tending to show that Intermountain's claimed credit for the Kearl Oil Sands project did not satisfy the business component test of section 41(d)(1) and (2).

But the Kearl Oil Sands project fails the section 174 test. Intermountain's records of the Kearl Oil Sands project do not indicate uncertainty existed. The Kearl Oil Sands project entailed manufacturing seven e-houses, a product that Intermountain had created many times before. While some of the e-houses had to be mirror images of each other, Intermountain's use of a CADD modeling program to flip the arrangement of structure did not establish uncertainty. Even if uncertainty existed, Intermountain must show it undertook investigative activities to discover information to eliminate uncertainty. *See* Treas. Reg. § 1.174-2(a)(1). Intermountain states it had to perform a series of structural calculations related to the e-house and that the information provided by the client was merely dimensional details. However, performing basic calculations on available data is not an investigative activity because Intermountain already has all the information to address that unknown. *See Betz*, T.C. Memo. 2023-84, at *84, *87. Intermountain did not identify any information that was unknown, nor did it identify any investigative activities. Accordingly, Intermountain did not face objective uncertainty during this project

[*51] and accordingly failed to establish that it satisfied the section 174 test.

We can look to the shrinking-back rule to determine whether any of the activities related to a component or a subcomponent of the Kearl Oil Sands project were qualified research. Intermountain identifies each of the seven e-houses as part of a larger system provided for ThyssenKrupp and did not provide specific information about uncertainty for any of the subcomponents of the e-houses. Additionally, to demonstrate that its engineers conducted qualified research, Intermountain relies heavily on hour logs in the form of Excel spreadsheets. While these spreadsheets are broken down by discipline, they are not consistently broken down by subset or issue confronted by Intermountain engineers. Thus, even if we shrink back to the subset of each part of the e-house, it would be futile. Intermountain did not provide sufficient information from which to conclude that it satisfied the section 174 uncertainty test at the level of any subcomponent.

Lastly, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. The record shows conflicting evidence regarding what might constitute research activities conducted by Intermountain engineers as part of those engineers' broader work on the project. From the evidence provided, we cannot conclude that 80% of Intermountain's activities on the Kearl Oil Sands project, or any component thereof, were part of a process of experimentation.

C. *Project 209564-1-1: Tallgrass Holyoke E-House*

The Tallgrass Holyoke e-house satisfies the business component test. On brief, Intermountain argues that the Tallgrass Holyoke e-house project was the first of five e-houses sold to Tallgrass Energy that created a new type of e-house. On brief, the Commissioner addresses the business component test only when addressing the four statutory tests for qualified research. Accordingly, the Commissioner has pointed to no evidence tending to show that Intermountain's claimed credit for the Tallgrass Holyoke e-house did not satisfy the business component test of section 41(d)(1) and (2).

Intermountain faced section 174 uncertainty during the Tallgrass Holyoke e-house project but failed to carry its burden to determine which portions of wages related to resolving the uncertainty. The Tallgrass Holyoke e-house was one of five e-houses constructed for

[*52] Tallgrass. The e-houses were to be placed along a pipeline to boost or maintain pressure within the pipeline, and Tallgrass required all the equipment to be housed together. This requirement created uncertainty because Intermountain not only had to create the longest e-house it had ever created, but it also had to design the equipment to not overheat, route cables separately for safety purposes, and combat environmental conditions. Accordingly, Intermountain faced uncertainty.

But as with the Hillsboro Longwall Project, we are unable to determine what expenses for the Tallgrass Holyoke e-house were related to the resolution of that uncertainty. The record contains conflicting evidence of the employee hours, and those hours were estimated after the fact. Additionally, an engineer on the project testified that he applied engineering time to another e-house for the same overall project. Thus, Intermountain has not satisfied its evidentiary burden with respect to substantiating expenses for the Tallgrass Holyoke e-house.

Lastly, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. The record shows conflicting evidence regarding the activities conducted by Intermountain engineers. Therefore, we cannot find that 80% of Intermountain's activities on the Tallgrass Holyoke e-house project were part of a process of experimentation.

D. *Project 209873-1-1: Hess GN-Cambrian E-House*

The Hess GN-Cambrian e-house satisfies the business component test. On brief, Intermountain argues that the Hess GN-Cambrian E-House was one of several LACT units provided to Hess that required Intermountain to consider different types of environments due to North Dakota weather and to engage in highly sophisticated programming. The Commissioner has pointed to no evidence tending to show that Intermountain's claimed credit for the Hess GN-Cambrian e-house did not satisfy the business component test of section 41(d)(1) and (2).

But the Hess GN-Cambrian e-house fails the section 174 test. Intermountain's records of the Hess E-House project do not indicate uncertainty existed. The Hess GN-Cambrian E-House was an LACT unit, a product that Intermountain had created before. Additionally, Intermountain's internal documentation of this project states that the e-house was approved for manufacturing less than a month after the customer order, complete electrical drawings were provided by the customer, it was a "repeat job" with the source being a previous

[*53] Intermountain project, and engineering the project took only 0.02 hours. Intermountain failed to identify any specific information that was not available to its engineers at the start of the project; rather, the evidence indicates it already possessed all of the information it needed to complete the project. Intermountain did not face uncertainty during this project and failed to satisfy the section 174 test as to the entirety of the Hess GN-Cambrian E-House.

We look next to the shrink-back rule to determine whether any of the activities related to a component or a subcomponent were qualified research. Intermountain states that when it manufactures an LACT, it manufactures the building, piping, automation, lighting, VFDs, transformers, and power. But Intermountain did not establish uncertainty for any of the subcomponents of this LACT. Additionally, to demonstrate that its engineers conducted qualified research, Intermountain relies heavily on hour logs in the form of Excel spreadsheets. While these spreadsheets are broken down by discipline, they are not consistently broken down by subset or issue confronted by Intermountain engineers. Thus, even if we shrink back to the subset of each part of the LACT, doing so would be futile. Accordingly, Intermountain fails the section 174 uncertainty test at the level of the subcomponent.

Lastly, even if the project were to satisfy the section 174 test, it fails the process of experimentation test. This test requires a "process designed to evaluate one or more alternatives to achieve a result where . . . the appropriate design of that result, is uncertain as of the beginning of the taxpayer's research activities." Treas. Reg. § 1.41-4(a)(5)(i). The process must follow the scientific method. *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1256. The record shows that the hours spent on the project were logged mainly for setup and production, which does not indicate a process following the scientific method. Intermountain did not establish that 80% of its activities on the Hess GN-Cambrian e-house project were part of a process of experimentation.

E. *Project 210464-1-1: Whiting Saltwater Disposal Skid*

The Whiting Saltwater Disposal Skid satisfies the business component test. The Whiting skid was a portable prefabricated automated pumping system. Intermountain argued that it had not built a pump system that processed the volume of fluid required by Whiting in a day. The Commissioner has pointed to no evidence tending to show

[*54] that Intermountain's claimed credit for the Whiting skid did not satisfy the business component test of section 41(d)(1) and (2).

The Whiting skid fails the section 174 test. Intermountain argues that there was uncertainty as to the appropriate design of the saltwater disposal skid because of technical challenges it had not faced before. The record before us does not support a finding that the uncertainty presented by these technical challenges were objective, or that investigative activities were used to resolve these uncertainties.

Intermountain fails to point to specific information that was not available to it at the start of the project. It points to limited information regarding the kind of pump required by the project. However, Intermountain's internal documents show that it ordered a pump that it had used in other locations. Intermountain further failed to demonstrate how uncertainty in one element of the Whiting skid created uncertainty throughout the entire system. As we recently said in *Betz*, T.C. Memo. 2023-84, at *76, uncertainty regarding a subset of the business component does not make the design of the entire business component uncertain. Intermountain employees provided sparse, conclusory testimony that a change in one subcomponent affected the basic design of the entire Whiting skid. Intermountain failed to establish that it satisfied the section 174 test as to the Whiting skid.

As with several other projects, we are similarly unable to apply the shrink-back rule to the Whiting skid. Intermountain did not identify the specific logged hours associated with subcomponents of the Whiting skid. Accordingly, we find Intermountain fails the section 174 uncertainty test at the level of the subcomponent.

Lastly, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. The record shows little evidence of employee hours logged for this project. Therefore, we cannot find that 80% of Intermountain's activities on the Whiting skid were part of a process of experimentation.

F. *Project 210554-1-1: Whiting E-House*

The Whiting e-house fails the business component test. The Whiting E-House was a small e-house to be sold and used in the state of Colorado. On brief, Intermountain merely states that "the project qualifies as it is a new business component for which qualified research time and expense were incurred to resolve uncertainty as to the

[*55] appropriate design at the outset, so that the subcomponent would function as intended." The business component test requires that a taxpayer intend that the information to be discovered be useful in the development of a business component and that to be useful, it need only provide some functional level of improvement. *See* I.R.C. § 41(d)(1)(B)(ii); *Union Carbide Corp. & Subs.*, 97 T.C.M. (CCH) at 1255. Given the limited documentation, there is no evidence that the e-house provided Intermountain any information that would provide a functional level of improvement to the production of e-houses. Accordingly, the Whiting e-house fails the business component test.

The Whiting e-house also fails the section 174 test. Intermountain manufactures countless e-houses for coal and oil extraction projects. The design for the Whiting e-house was a "standard building design" and was based on an existing design. Most of the employee hours were spent manufacturing and assembling the e-house, not engineering it. The consequence of repetition is expertise. This project represents minor alterations to a standard, stock design and did not involve resolving any section 174 uncertainty. Intermountain fails to satisfy the section 174 test as to the entirety of the Whiting e-house.

We are similarly unable to apply the shrink-back rule to the Whiting e-house. Intermountain did not identify the specific subcomponents of the Whiting e-house and only provided a log of hours for the project as a whole. Accordingly, we find Intermountain fails the section 174 uncertainty test at the level of any subcomponents.

Lastly, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. The record shows 9.08 combined hours logged for engineering and testing for this project, with more than 100 hours logged to various aspects of manufacturing. Intermountain did not establish that "substantially all" of its activities on the Whiting e-house were part of a process of experimentation.

G. *Project 208277-2-1: Whiting Dual 500 HP Stage Loader VFD Controller*

The Whiting Dual 500 HP Stage Loader VFD Controller fails the business component test. The Whiting Dual 500 HP Stage Loader VFD Controller is a device that controls the speed of the belt system transporting coal out of a mine. On brief, Intermountain merely states that the "project qualifies as it is a new business component for which

[*56] qualified research time and expense were incurred to resolve uncertainty as to the appropriate design at the outset, so that the subcomponent would function as intended." On brief, the Commissioner addresses the business component test only when addressing the four statutory tests for qualified research. Similar to the Whiting e-house, Intermountain did not establish that the Whiting Dual 500 HP Stage Loader VFD Controller provided it with any information that would provide a functional level of improvement to the production of controllers. Accordingly, the Whiting Dual 500 HP Stage Loader VFD Controller fails the business component test.

The Whiting Dual 500 HP Stage Loader VFD Controller also fails the section 174 test. Intermountain attributes the dearth of documentation for this project to its being a subcomponent of a longwall system. Intermountain asserts that the project "systems have a high degree of complexity and required [Intermountain] to go through its complete engineering process to develop." The record does not provide enough facts to establish that Intermountain faced the uncertainty contemplated by section 174. Rather, we are left to infer that, because the product was complicated, research was required. This does not suffice. Intermountain fails to satisfy the section 174 test as to the entirety of the Whiting Dual 500 HP Stage Loader VFD Controller.

As to the shrink-back rule, Intermountain urges us to apply it to the portion of time its engineering staff dedicated to the project. For the Whiting Dual 500 HP Stage Loader VFD Controller, Intermountain reported 3.52 engineering hours. We are unable to isolate engineering hours for the purpose of applying the shrink-back rule without some explanation for what qualifying uncertainty Intermountain faced as to what subcomponent. Failing to establish either, Intermountain fails the section 174 uncertainty test at the level of the subcomponent.

Again, even if the project were to satisfy the section 174 test, Intermountain did not establish that it met the "substantially all" requirement of the process of experimentation test. The record shows 3.54 combined hours logged for engineering and testing for this project, with more than 100 hours logged to various aspects of manufacturing. Therefore, we cannot find that any of Intermountain's activities on the Whiting Dual 500 HP Stage Loader VFD Controller were part of a process of experimentation.

[*57] H. *Project 024649-1-1: Morgantown Electrical Controller*

The Morgantown Electrical Controller satisfies the business component test. The Morgantown Electrical Controller was for a longwall mobile tailpiece, something new for Intermountain. The Commissioner has pointed to no evidence tending to show that Intermountain's claimed credit for the Morgantown Electrical Controller did not satisfy the business component test of section 41(d)(1) and (2).

The Morgantown Electrical Controller fails the section 174 test. Although Intermountain makes conclusory statements that it conducted qualified research to resolve uncertainty as to the appropriate design of the project, Intermountain also admits that there is minimal documentation for the project. Without additional information, we are unable to determine the nature of the uncertainty Intermountain faced. Therefore, Intermountain has failed to establish that there was objective uncertainty as to the appropriate design of the Morgantown Electrical Controller. Intermountain fails to satisfy the section 174 test as to the entirety of the Morgantown Electrical Controller.

We are similarly unable to apply the shrink-back rule, because documentation is lacking at the level of both the business component and any relevant subcomponent. Accordingly, we find Intermountain fails the section 174 uncertainty test at the level of the subcomponent.

Again, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. The record shows 25.1 employee hours logged as "repair hours" for this project. Repair hours are not research hours; thus Intermountain's activities on the Morgantown Electrical Controller were not part of a process of experimentation.

I. *Project 206901-1-1: North Antelope Flash Protection Door*

The North Antelope Flash Protection Door satisfies the business component test. Intermountain custom-designed a door for use in the North Antelope Rochelle Mine capable of protecting against an arc flash. On brief, it asserts that "it is a new business component for which qualified research time and expense were incurred to resolve uncertainty as to the appropriate design at the outset, so that the subcomponent would function as intended for a power center for a mine." On brief, the Commissioner addresses the business component test only when addressing the four statutory tests for qualified research.

[*58] Accordingly, the Commissioner has pointed to no evidence tending to show that Intermountain's claimed credit for the North Antelope Flash Protection Door did not satisfy the business component test of section 41(d)(1) and (2).

The North Antelope Flash Protection Door fails the section 174 test. Intermountain does not assert that customizing the door required the use of qualified research. Intermountain provided minimal internal records showing about 25 hours of laser cutting and painting for the project, with none spent on engineering. The record also shows that Intermountain had previously designed equipment to address arc flashes. If Intermountain faced uncertainty as to the design, the record does not provide sufficient facts for us to reach such a conclusion. Intermountain fails to satisfy the section 174 test as to the entirety of the North Antelope Flash Protection Door.

The shrink-back rule cannot be applied. The requisite uncertainty to satisfy section 174 is missing at the level of both the business component and the subcomponent. Therefore, the North Antelope Flash Protection Door fails the section 174 test at the level of the subcomponent.

Even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. The record shows employee hours logged only for lasering and painting, which are not research hours. Thus, Intermountain's activities on the North Antelope Flash Protection Door were not part of a process of experimentation.

J. *Project 69545: Minero Bolero Mine Transformer*

The Minero Bolero Mine Transformer satisfies the business component test. In building the Minero Bolero Mine Transformer, Intermountain created and sold a custom transformer that addressed uncertainties due to specific factors of that mine. The Commissioner has pointed to no evidence tending to show that the Minero Bolero Mine Transformer did not satisfy the business component test of section 41(d)(1) and (2).

But the Minero Bolero Mine Transformer fails the section 174 test. There is limited documentation for the Minero Bolero Mine Transformer project. Intermountain observes that this project was a subcomponent of a larger project and thus had less documentation. However, as it is a trial project, we will apply the same tests we have

[*59] applied to other trial projects. The burden of proof does not change with the size of the project.

Intermountain did not establish that it faced uncertainty with respect to the Minero Bolero Mine Transformer. Intermountain claims that it faced uncertainty as to the proper size and space constraints, power requirements, environmental conditions it was required to withstand, and certain orientation requirements for appliances. But this statement was made in reference to all custom transformers, not specifically the Minero Bolero Mine Transformer. It is, at best, unclear from the record what investigative activities Intermountain undertook to resolve these uncertainties for this project. Also, in *Phoenix Design Group*, T.C. Memo. 2024-113, at *33, we rejected the argument that uncertainty exists because of the possibility of revising the design before construction was complete or after it arrived at the test site. We also note that employees for this project did not log any hours for engineering work.

Given that this project is a subcomponent with limited documentation, we are not able to apply the shrink-back rule. Therefore, the Minero Bolero Mine Transformer fails the section 174 test at the subcomponent level.

Again, even if the project were to satisfy the section 174 test, it fails the "substantially all" requirement of the process of experimentation test. Intermountain recorded 39.98 hours for fabrication, 127.4 hours for final assembly, and 23.57 hours for painting for this project. No hours were recorded for engineering or testing the product. On this record, fabrication, assembly, and painting are not research hours; thus Intermountain's activities on the Minero Bolero Mine Transformer were not part of a process of experimentation.

K. *RD-0000 and RD-0009*

The parties agree that RD-0000 and RD-0009, the GLT 500 and GMS 504-DZ respectively, constitute qualified research. They disagree, however, on the amount of qualified expenses, which we discuss below.

Mr. Curtis oversaw the research and development department and worked on all of Intermountain's proprietary products. Because research and development was his principal work, we find the estimates of his time for these projects credible. We also find credible the time estimates for the interns he supervised, Mr. Erramouspe and Mr. Wayman. The record contains supply costs for Intermountain's

[*60] proprietary projects and alliantgroup's estimates of research and development QREs based on Intermountain's employees' gross salaries for each of the years in issue. Unlike the Hillsboro Longwall project, which had conflicting evidence regarding the estimated hours worked by the employees, the time estimates of the people working on the proprietary projects appear reliable. However, the record does not contain sufficient evidence of substantiation for the contractor costs.

The Commissioner concedes that Intermountain has wage and supply QREs for these projects totaling $287,162 and $243,944, which could be allocated over 2011 through 2014. The Commissioner does not address 2015, because the record does not contain an alliantgroup credit study for 2015. But as Intermountain correctly argues, testimony from the alliantgroup corporate representative supports that they did a study and the record contains the information necessary to support Intermountain's wage and supply QREs for projects RD-0000 and RD-0009 for 2015, as well.

IV. *Quantification of Qualified Research Expenditures*

The parties agree that RD-0000 and RD-0009 constitute qualified research, but they do not agree on the amount of research expenditures or how to quantify the qualified research expenditures. Intermountain is entitled to the amount of the credit that it can substantiate. In terms of qualified wages, Intermountain claims costs for all employees and third-party contractors paid in connection with these proprietary research projects. Intermountain, however, provides sufficient records showing costs for only its own employees. Therefore, Intermountain can claim a credit only for the amount it established, which is the amount paid in wages to its own employees involved in the proprietary research projects.

Conclusion

As we said in *Phoenix Design Group*, T.C. Memo. 2024-113, at *45, "engineers solve problems you did not know you had in ways you cannot understand." We believe that this is very much the case with projects completed by Intermountain. With the exception of the proprietary research projects, Intermountain failed to substantiate its entitlement to research credits under section 41. For those proprietary projects, Intermountain established that it is entitled to the research credit to the extent of the amounts paid to its own employees involved in the proprietary research projects.

[*61] To reflect the foregoing,

An appropriate order will be issued.