IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

US FOAM, INC, et al, Plaintiffs, v. ON SITE GAS SYSTEMS, INC. Defendant.	§	CIVIL ACTION NO. 2-07-cv-466-TJW Consolidated for *Markman* with:
ON SITE GAS SYSTEMS, INC. Plaintiff, v. USF TECHNOLOGIES, INC., et al, Defendants.	§	CIVIL ACTION NO. 6:08-cv-231-LED
USF EQUIPMENT AND SERVICES, LTD., et al Plaintiffs, v. ALLIED INTERNATIONAL EMERGENCY, LLC., et al. Defendants.	§	CIVIL ACTION NO. 2-07-cv-490-TJW
US FOAM, INC., et al Plaintiffs, v. CUMMINS INDUSTRIES, INC., et al, Defendants.	§	CIVIL ACTION NO. 2-07-cv-491-TJW-CE

MEMORANDUM OPINION AND ORDER

The Court held a *Markman* hearing on June 2, 2010. After considering the submissions and the arguments of counsel, the Court issues the following order regarding claim construction:

I. Introduction

Four cases have a consolidated *Markman* hearing involving three patents. In three cases, US Foam, Inc., USF Equipment Services, LTD., and Alden Ozment (collectively "US Foam") have asserted U.S. Patents No. 7,096,965 ("the '965 patent") and 7,104,336 ("the '336 patent") against various defendants.1 In the fourth case, On Site asserts U.S. Patent No. 6,988,558 ("the '558 patent") against US Foam. The following chart identifies the parties and patents:

Plaintiff	Defendant	Asserted Patent(s)	Cause Number
US Foam	Allied	'965 and '336 patents	2:07-cv-490
US Foam	Cummins	'965 and '336 patents	2:07-cv-491
US Foam	On Site	'965 and '336 patents	2:07-cv-466
On Site	US Foam	'558 patent	6:08-cv-231

II. Background of the Techonology

A. The '965 and '336 patents

The '965 patent is entitled "Method and Apparatus for Fighting Fires in Confined Areas." The '965 patent was filed on July 16, 2003 and issued on August 29, 2006 to Alden Ozment. The technology described in the '965 patent relates generally to introducing nitrogen to a mixture of foam concentrate and liquid, thereby creating a fire suppressant foam. Applying this "nitrogen expanded foam" to a fire in a confined space smothers the fire. The invention specifies nitrogen as the preferable gas to aerate the foam because oxygen encourages combustion. The '965 patent

1 The defendants include Allied International Emergency, LLC, Mel Hammit, and TyMcKee (collectively "Allied"), Cummins Industries, Inc., CASFSCO, and Mark Cummins (collectively "Cummins"), and On Site Gas Systems, Inc. ("On Site"). This memorandum will refer to all of these parties as Defendants, collectively.

includes a foam dispenser that further expands the nitrogen-aerated foam and allows fire fighters to use it from a safe distance.

The '336 patent is a continuation-in-part of the'965 patent. The '336 patent discloses additional features, such as using chilled nitrogen and implementing the invention in a self-contained unit.

B. The '558 patent

The '558 patent was filed on February 1, 2001 and issued on January 24, 2006, relates to a method of extinguishing a fire by injecting gas onto the fire using a foam powder or water. The gases disclosed include argon, nitrogen, and carbon dioxide. The '588 patent is not targeted to coal mines and focuses on the composition of the gas. The patent describes using synthetic chemicals to create foam filled with fire-extinguishing gas.

III. General Principles Governing Claim Construction

"A claim in a patent provides the metes and bounds of the right which the patent confers on the patentee to exclude others from making, using or selling the protected invention." *Burke, Inc. v. Bruno Indep. Living Aids, Inc.*, 183 F.3d 1334, 1340 (Fed. Cir. 1999). Claim construction is an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970-71 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996).

To ascertain the meaning of claims, the court looks to three primary sources: the claims, the specification, and the prosecution history. *Markman*, 52 F.3d at 979. Under the patent law, the specification must contain a written description of the invention that enables one of ordinary skill in the art to make and use the invention. A patent's claims must be read in view of the specification, of which they are a part. *Id.* For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims.

Id. "One purpose for examining the specification is to determine if the patentee has limited the scope of the claims." *Watts v. XL Sys., Inc.*, 232 F.3d 877, 882 (Fed. Cir. 2000).

Nonetheless, it is the function of the claims, not the specification, to set forth the limits of the patentee's claims. Otherwise, there would be no need for claims. *SRI Int'l v. Matsushita Elec. Corp*., 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc). The patentee is free to be his own lexicographer, but any special definition given to a word must be clearly set forth in the specification. *Intellicall, Inc. v. Phonometrics*, 952 F.2d 1384, 1388 (Fed. Cir. 1992). And, although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim language is broader than the embodiments. *Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994).

This court's claim construction decision must be informed by the Federal Circuit's decision in *Phillips v. AWH Corporation*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the court set forth several guideposts that courts should follow when construing claims. In particular, the court reiterated that "the *claims* of a patent define the invention to which the patentee is entitled the right to exclude." 415 F.3d at 1312 (emphasis added) (*quoting Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To that end, the words used in a claim are generally given their ordinary and customary meaning. *Id*. The ordinary and customary meaning of a claim term "is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id*. at 1313. This principle of patent law flows naturally from the recognition that inventors are usually persons who are skilled in the field of the

invention. The patent is addressed to and intended to be read by others skilled in the particular art. *Id*.

The primacy of claim terms notwithstanding, *Phillips* made clear that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id*. Although the claims themselves may provide guidance as to the meaning of particular terms, those terms are part of "a fully integrated written instrument." *Id*. at 1315 (*quoting Markman*, 52 F.3d at 978). Thus, the *Phillips* court emphasized the specification as being the primary basis for construing the claims. *Id*. at 1314-17. As the Supreme Court stated long ago, "in case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the language employed in the claims." *Bates v. Coe*, 98 U.S. 31, 38 (1878). In addressing the role of the specification, the *Phillips* court quoted with approval its earlier observations from *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998):

> Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

Consequently, *Phillips* emphasized the important role the specification plays in the claim construction process.

The prosecution history also continues to play an important role in claim interpretation. The prosecution history helps to demonstrate how the inventor and the PTO understood the patent.

Phillips, 415 F.3d at 1317. Because the file history, however, "represents an ongoing negotiation between the PTO and the applicant," it may lack the clarity of the specification and thus be less useful in claim construction proceedings. *Id*. Nevertheless, the prosecution history is intrinsic evidence. That evidence is relevant to the determination of how the inventor understood the invention and whether the inventor limited the invention during prosecution by narrowing the scope of the claims.

Phillips rejected any claim construction approach that sacrificed the intrinsic record in favor of extrinsic evidence, such as dictionary definitions or expert testimony. The *en banc* court condemned the suggestion made by *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed. Cir. 2002), that a court should discern the ordinary meaning of the claim terms (through dictionaries or otherwise) before resorting to the specification for certain limited purposes. *Id*. at 1319-24. The approach suggested by *Texas Digital*–the assignment of a limited role to the specification–was rejected as inconsistent with decisions holding the specification to be the best guide to the meaning of a disputed term. *Id*. at 1320-21. According to *Phillips*, reliance on dictionary definitions at the expense of the specification had the effect of "focus[ing] the inquiry on the abstract meaning of words rather than on the meaning of the claim terms within the context of the patent." *Id*. at 1321. *Phillips* emphasized that the patent system is based on the proposition that the claims cover only the invented subject matter. *Id.* What is described in the claims flows from the statutory requirement imposed on the patentee to describe and particularly claim what he or she has invented. *Id*. The definitions found in dictionaries, however, often flow from the editors' objective of assembling all of the possible definitions for a word. *Id*. at 1321-22.

Phillips does not preclude all uses of dictionaries in claim construction proceedings. Instead, the court assigned dictionaries a role subordinate to the intrinsic record. In doing so, the court emphasized that claim construction issues are not resolved by any magic formula. The court did not impose any particular sequence of steps for a court to follow when it considers disputed claim language. *Id*. at 1323-25. Rather, *Phillips* held that a court must attach the appropriate weight to the intrinsic sources offered in support of a proposed claim construction, bearing in mind the general rule that the claims measure the scope of the patent grant.

IV. Agreed Terms

A. The '336 and '965 patents

The Court adopts the following constructions, as agreed to by the parties:

Disputed term	Construction
about 0.1% to about 1.0% Patent '965 Claim 6	A range that includes concentrations about 0.1% by volume to about 1.0% by volume.
About Patent '336 Claims 1, 4, 5, 6, 7, 10, 11, 12 Patent '965 Claims 3, 6	approximately
admixture Patent '336 Claim 3	the act of mixing
chilled nitrogen Patent '336 Claim 1	nitrogen that has had its temperature lowered
chilled Patent '336 Claims 6, 7	lowered in temperature
chilled essentially simultaneously Patent '336 Claim 2	chilled at almost the same time or at the same time
chilling Patent '336 Claim 1	lowering the temperature

Disputed term	Construction
dispensed Patent '336 Claims 4, 5, 10, 12 Patent '965 Claims 1, 9, 11, 13	discharged
dispensing Patent '336 Claims 1, 8 Patent '965 Claim 4	discharging
drawing out Patent '965 Claim 10	to remove
flowing stream Patent '336 Claims 1, 9 Patent '965 Claim 4	a fluid or liquid that is moving
flowing stream Patent '336 Claims 1, 9 Patent '965 Claim 4	a fluid or liquid that is flowing
ingress point Patent '965 Claim 1	an entrance
introduction of nitrogen Patent '336 Claim 9	allowing nitrogen to be added
providing at least one ingress point Patent '965 Claim 9	providing at least one entrance.
Ratio of about Patent '965 Claim 3	proportion of approximately
stream Patent '336 Claim 1 Patent '965 Claims 1, 2, 3, 4, 9, 11	a fluid or liquid that is moving

B. The '558 patent

The parties have not agreed to the constructions of any of the terms in the '558 patent.

V. Disputed Terms

A. The '336 and '965 patents

1. "fire"-related terms

Disputed term	US Foam	Defendants
[area] involved in fire Patent '336 Claim 1, 8 Patent '965 Claim 1, 2, 9, 10, 13	area that is on fire	the [portion of the mine/sealed portion of the mine/portion of the coal mine] that is burning, which is shown by borehole temperatures of 90° F or greater
areas of the confined area that are free of fire Patent '336 Claim 8	portions of the confined area that are not on fire	the portion of the mine outside the sealed area that is not burning, which is shown by borehole temperatures of less than 90° F
coal mine fire Patent '336 Claim 8	burning of combustible material in a coal mine	the burning of combustible material, as shown in a coal mine fire by borehole temperatures of 90° F or greater
fire Patent '336, Claims 1, 8 Patent '965 Claims 1, 4, 9	burning of combustible material	the burning of combustible material, as shown in a coal mine fire by borehole temperatures of 90° F or greater
uninvolved areas of said mine shaft Patent '965 Claim 9	areas of the mine shaft that are not on fire	the portion of the mine that is not burning, which is shown by borehole temperatures of less than 90° F

The parties agree that a "fire" is "the burning of combustible material." Defendants attempt to add an additional limitation that a fire, as used in the claims, is also to be defined by a borehole temperature reading of greater than 90 degrees Fahrenheit. Defendants find their 90-degree

limitation from the specification's repeated statements that a fire is considered to be extinguished when the surface temperature is reduced to 90 degrees or below. *See* '336 patent, 5:52–57; 6:30–35; 9:42–46; 10:53–59; 9:65–10:1; 11:1–4. While that may be true, it tells a person of ordinary skill in the art what it means to *extinguish* a fire, not what it means for there to be a fire. For example, if a borehole temperature read 95 degrees, but there has never been any burning of combustible material, according to Defendants' proposal, the temperature reading alone would indicate that there was a fire even in the absence of burning. Common sense tells the Court that Defendant's proposed limitation cannot be part of the correct construction. The Court construes "fire" to mean "burning of combustible material."

The Court further adopts the following fire-related constructions.

[area] involved in fire	area in which there is burning of combustible material
areas of the confined area that are free of fire	portions of the confined area in which there is an absence of the burning of combustible material
coal mine fire	burning of combustible material in a coal mine
uninvolved areas of said mine shaft	areas of the mine shaft in which there is no burning of combustible material

2. "extinguish"-related terms

Disputed term	US Foam	Defendants
extinguishing a fire Patent '336 Claim 1 Patent '965 Claims 1, 4, 9	If construed to be limiting then, "ceasing the burning of a fire, in whole or in part"	to cause the fire to stop burning completely, as shown in a coal mine fire by reducing the borehole temperatures of less than 90° F
fighting a coal mine fire Patent '336 Claim 8	attempting to cease the burning of a coal mine fire, in whole or in part	to cause the burning to stop completely, as shown in a coal mine fire by reducing the borehole temperatures to less than 90° F

Disputed term	US Foam	Defendants
initiate suppression of the fire Patent '336 Claim 8	to begin to cease the burning of a fire	to begin the process of stopping the fire from burning

The parties have three main disputes with respect to the "extinguish" terms. First, they dispute whether the preambles containing the word "extinguish" are limiting. Second, they dispute whether extinguishment requires complete cessation of burning, or only partial cessation. Third, the parties dispute whether the surface temperature must be reduced to 90 degrees in order for a mine fire to be extinguished.

"In general, a preamble limits the invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim. . . . A preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention." *Vizio, Inc. v. Int'l Trade Com'n*, 605 F.3d 1330, 1340 (Fed. Cir. 2010) (internal citations and quotations omitted). In dispute are the preambles of claims 1, 4, and 9 of the '965 patent, and claim 1 of the '336 patent. The '965 patent, claims 1, 4, and 9 all recite essential structure in the preamble. In claims 1 and 9, the preamble recites "mine shaft," which reappears in the first step as "said mine shaft." Likewise, in Claim 4 of the '965 patent, the preamble recites "poorly ventilated area," which provides the antecedent basis for "said poorly ventilated area" in the last step of the method. Moreover, the phrase "extinguishing a fire" is "the essence or fundamental characteristic" of the inventions. *See id.* at 1341 (finding that "decoding" as used in the preamble "was properly construed as a claim limitation . . . because [the term] is the essence or a fundamental characteristic of the claimed

invention"). The Court will construe the preambles.

The next issue for the Court to resolve is whether "extinguishing a fire" requires complete extinguishment, as Defendants contend. Defendants rely on statements in the prosecution history, arguing that the patentee overcame a prior art reference in which "a mine cavity could [not] be completely filled to smother hot spots on the sides and top portions of [a mine] shaft." Amendment, Sept. 1, 2005. This language does not support Defendants' argument. The language merely shows that the invention provided a superior manner of covering and smothering a fire, not that the fire needs to be extinguished completely. Nonetheless, the Court finds support in the specification for Defendant's position. Explaining the problems associated with confined areas, the specification recites, "providing additional combustible material to feed the fire . . . make[s] extinguishing of such a fire, other than letting the fire burn itself out, even more difficult if not impossible." '965 patent, 3:1–3. If a fire need only partially cease burning to be extinguished, "letting the fire burn itself out" is an excessively limited view of available options in the absence of a seal to keep air out of the burning area. A partially extinguished fire that has been allowed to "burn itself out" will refuel if the confined area is opened to permit miners to reenter. Moreover, the quote from the "Mine Fires" book also indicates that extinguishment, as understood by the patentee, must be complete. "[H]igh expansion foams have not yet extinguished a real mine fire." '965 patent, 4:11–12. Certainly some foams had been able to cease at least some burning, *i.e.*, "extinguish" according to US Foam. Upon reading this sentence, one of ordinary skill in the art would understand the invention to be directed toward complete extinguishment, or ceasing the burning of combustible materials in whole. The Court declines to include "in whole or in part" as part of the construction for any of the "extinguish" related terms.

Finally, with respect to the 90-degree limitation, Defendants argue that a fire is only extinguished when the surface temperature is reduced to 90 degrees or lower. Defendants rely on the patentee's pervasive statements throughout the '336 patent that "90 degrees Fahrenheit is the temperature that is accepted as the point at which the fire is considered to be extinguished." '336, 5:52–57. *See also* '336, 6:30–35; 9:42–46; 10:53–59; 9:65–10:1; 11:1–4. The Court must be careful not to import a limitation from the specification, "[b]ut 'the line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court's focus remains on understanding how a person of ordinary skill in the art would understand the claim terms.'" *ICU Medical, Inc. v. Alaris Medical Systems, Inc.*, 558 F.3d 1368, 1375 (Fed. Cir. 2009) (internal quotations omitted). In light of the repeated statements that a fire is extinguished only if it reaches 90 degrees, one skilled in the art would understand "extinguished," as claimed in the '336 patent, to require just such a reduction in temperature. *See id. See also Chamberlain Group, Inc. v. Lear Corp.*, 516 F.3d 1331 (Fed. Cir. 2008) (finding that the patent restricted "binary code" to a narrower meaning than otherwise understood).

Ordinarily, the same claim term appearing in related patents would carry the same meaning. *See Boss Indus., LLC v. Yamaha Motor Corp.*, 333 Fed.Appx. 531, 536–37 (Fed. Cir. 2009) ("[B]ecause each patent-in-suit is derived from the same parent application and shares many common terms with its sister patents, the district court correctly interpreted [the disputed term] consistently across all of the asserted patents.") (citing *NTP, Inc. v. Research In Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2003)); *Omega Eng'g., Inc. v. Raytek Corp.*, 334 F.3d 1314, 1334 ("[W]e presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning."). The '336 patent is a continuation-in-part

of the ‘965 patent and, the specifications have significant differences that are material to the Court’s construction of “extinguish.” The ‘965 patent makes no mention whatsoever of any temperature limitations, let alone a 90-degree limitation for extinguishment. Reading the ‘965 patent independently of the ‘336 patent, a person of ordinary skill in the art would not understand “extinguish,” as used in the ‘965 patent, to require a reduction in temperature to 90 degrees or below. By defining “extinguish” in the ‘336 patent, the patentee chose to give the continuation-in-part a narrower scope than its parent. This is a rare case where the same claim term in two related patents does not share the same meaning.

What causes the Court concern, however, is the Defendant’s introduction of “borehole temperature readings” to the definition of “extinguish.” The term “borehole” never appears in the specification and Defendants resort to extrinsic evidence to support the additional limitation. While Defendants may be correct that coal miners customarily check the temperature at the surface of the mine by reading borehole temperatures, there is no support in the intrinsic record for limiting the manner in which miners measure temperature. The Court construes “extinguishing a fire,” as used in the ‘336 patent, to mean “ceasing the burning of combustible material, as shown by mine surface temperatures of 90 degrees Fahrenheit or less.” The Court construes “extinguishing a fire,” as used in the ‘965 patent, to mean “ceasing the burning of combustible material.” “Fighting a coal mine fire” means “attempting to extinguish a coal mine fire.” “Initiate the suppression of the fire” means “to begin extinguishing the fire.”

3. "seal", "confined area" and "poorly ventilated" terms

Disputed term	US Foam	Defendants
after it has been sealed Patent '965 Claim 10	after it has been allowed to be made firmly closed	after utilizing a fire proof barrier to confine an area of a coal mine involved in fire
confined area of a coal mine Patent '336 Claim 8	a site in a coal mine having normally limited ventilation and limited access for extinguishing a fire	Interior of a coal mine.
forming a seal Patent '965 Claim 9	firmly closing or securing	creating an air tight fire-proof barrier to confine an area of the coal mine on fire
poorly ventilated area Patent '965 Claim 4	An area where the circulation of fresh air is poor.	Any confined area, including coal mines, storage tanks, and the like
seal Patent '965 Claim 14	object that firmly closes or secures	a fire proof barrier to confine an area of a coal mine involved in fire
sealed portion Patent '336 Claims 8, 10, 12	firmly closed or secured portion	the sealed portion of the mine that is burning, which is shown by borehole temperatures of 90° F or greater
sealing of a confined area Patent '336 Claim 8	allowing a confined area to be firmly closed or secured	a fire proof barrier to confine an area of a coal mine involved in fire
sealing Patent '336 Claim 8	firmly closing or securing	creating an air tight fire-proof barrier to confine an area of the coal mine on fire

The parties dispute whether a "confined area" must be sealed and whether a "seal" must be fire-proof or just firmly closed. The patentee gave an express definition for "confined area" in

both patents. '965 patent, 2:63–3:3; '336 patent, 3:57–65. Although both patents do not use identical definitions, they are sufficiently similar for the Court to discern the common meaning. The '965 patent defines "confined area" to mean "an area of combustible material that is located at a site having normally limited ventilation and limited access in which combustion by-products can be confined and can pose a threat to personnel attempting to extinguish a fire at the site as well as providing additional combustible material to feed the fire and make extinguishing of such a fire, other than letting the fire burn itself out, even more difficult if not impossible." '965 patent, 2:63–3:3. The '336 patent simplifies the definition: "a site having normally [limited] ventilation and limited access for extinguishing a fire." '336 patent, 3:57–65.[2] While it may appear at first glance that the Court is choosing between two different explicit definitions, the second definition is merely a simpler clarification of the first. "Confined area" has the same scope in both patents and will be construed consistently. *See Omega Eng'g., Inc. v. Raytek Corp.*, 334 F.3d at 1334. The Court construes "confined area of a coal mine" to mean "a site in a coal mine having normally limited ventilation and limited access for extinguishing a fire."

For the "poorly ventilated area" terms, US Foam applies dictionary definitions to create its proposal whereas Defendants propose construing "poorly ventilated area" to be the same as "confined area." A confined area, as defined in the specification, has two characteristics—limited ventilation *and* limited access. There is no support for requiring that a poorly ventilated area have limited access. US Foam introduces a "fresh air" requirement, though it appears in one of several possible definitions for "ventilate," has no support in the claims or specification. *See* WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH

2 The '336 specification uses the word "linked" rather than "limited." The context of this sentence and the corresponding sentence in the '965 specification make clear to the Court that the intended word was "limited."

LANGUAGE UNABRIDGED (1993) ("to cause fresh air to circulate through and vitiated or contaminated air to be simultaneously withdrawn from"). The Court construes "poorly ventilated area" to mean "an area where the circulation of air is poor."

The parties dispute whether a seal must be fire proof and air tight. In both the '336 and '965 patents, the patentee says that a seal "must be fire proof and provide a suitable opening to permit the dispensing of foam to the area involved in fire." '965 patent, 3:38–41; '336, 4:58–61. Moreover, as used in the claims, if a seal were not fireproof, then there would be no way to keep an "uninvolved area" of a mine shaft free from fire. *See* '965 patent, claim 9 ("forming a seal between an area of said mine shaft involved in fire and uninvolved areas of said mine shaft"). Both the specification and claims support the conclusion that a seal is fire proof.

Defendants also seek to add an air tight limitation, which the Court agrees has support. In Claim 10, the invention adds the step of "drawing out at least a portion of the ambient atmosphere from said area involved in fire after it has been sealed." If the seal had no air tight characteristics, this step could not be completed; whatever air that was drawn out would simply be replaced by air outside of the seal. However, given the irregular surfaces of the walls of a mine, the Court can comfortably conclude that one of ordinary skill in the art would not understand the seal to be perfectly air tight. The Court construes "seal" to mean "a fire proof barrier that is substantially air tight."

The Court further construes the remaining terms involving "seal":

after it has been sealed	after it has been closed with a fire proof barrier that is substantially air tight
forming a seal	closing with a fire proof barrier that is substantially air tight
sealed portion	area behind a seal where the fire is located
sealing	closing with a fire proof barrier that is substantially air tight

4. "diffuser" terms

Disputed term	US Foam	Defendants
diffuser/dispenser apparatus Patent '965 Claims 1, 9	an apparatus that allows fluid to be discharged freely	a device for mixing nitrogen with stream of liquid through a screen or small holes, and then injects or places the expanded foam on a fire
diffuser Patent '965 Claims 1, 9	an apparatus that permits substances to spread freely	an apparatus that allows gas to be added through a screen or small holes

As used in the claims, a diffuser is used to add the nitrogen to the foam concentrate (i.e., "introducing a gas comprising nitrogen under pressure to said stream of foam concentrate/liquid mixture by a diffuser/dispenser apparatus"). The specification explains that "[t]he foam is expanded and dispersed through a diffuser/dispenser apparatus that functions to introduce pressurized nitrogen into the water/foam concentrate stream to expand the foam and to dispense the expanded foam." '965, 4:62–65. The Court construes "diffuser" to mean "an apparatus that introduces pressurized nitrogen into the water/foam concentrate stream to expand the foam." The Court construes "diffuser/dispenser apparatus" to mean "an apparatus that introduces pressurized nitrogen into the water/foam concentrate stream to expand the foam and to discharge the expanded foam."

5. "nitrogen"- related terms

Disputed term	US Foam	Defendants
consisting essentially of nitrogen Patent '965 Claim 4	a gas other than air that includes nitrogen and may include additional gases but does not include additional gases that contain highly combustible substances in sufficient concentrations to support combustion	consisting essentially means a gas containing more than 75% nitrogen (Cummins)
gas comprising nitrogen Patent '965 Claims 1, 9	A gas, other than air, that includes nitrogen and may include additional gases.	Any gas containing nitrogen, including air (On Site)
gas consisting essentially of nitrogen Patent '965 Claim 4	A gas, other than air, that includes nitrogen and may include additional gases but does not include additional gases that contain highly combustible substances in sufficient concentrations to support combustion.	A gas containing mainly nitrogen, substantially without oxygen (On Site)
nitrogen containing gas Patent '965 Claim 11	a gas other than air that includes nitrogen and may include additional gases but does not include additional gases that contain highly combustible substances in sufficient concentrations to support combustion	nitrogen as described in the '443 Patent, Column 2, Line 68 and in the '375 Patent, Column 3, Lines 39-40 (Cummins)

The parties alternately dispute whether the nitrogen that is injected into the foam concentrate mixture can contain oxygen. US Foam seeks to give "gas consisting essentially of nitrogen," "nitrogen containing gas," and "gas comprising nitrogen" equivalent meanings: "a gas, other than air, that includes nitrogen and may include additional gases." US Foam makes a distinction for "gas consisting essentially of nitrogen," by adding the limitation that it does not contain combustible amounts of oxygen. Defendants argue that "gas comprising nitrogen" and "gas

consisting essentially of nitrogen" are very different things. Importantly, Defendants contend that "gas comprising nitrogen" can include air, which is 78% nitrogen and contains sufficient oxygen to support combustion. Defendants argue that "comprising" is a broad and open-ended term that can include anything else whereas "consisting essentially of" is much narrower and contains very little else. According to Defendants, the patentee knew how to draft narrowly and broadly and chose to do both.

US Foam argues that the patentee expressly disclaimed air as the foam-producing gas. *See* '965 patent, 4:48–53 ("Conventionally air is used as the gas in forming high expansion foams. However, in view of the need to reduce the oxygen content in the mine at the area involved in the fire, contributing to the oxygen content in the sealed area by the expanded foam is undesirable. Accordingly, a gas consisting essentially of nitrogen is employed as the expanding gas."). In that passage, the patentee describes "gas consisting essentially of nitrogen" as a gas that will not contribute oxygen to the fire. If the foam were to be expanded with air, the substantial concentration of oxygen in the air would "add[] a highly combustible substance to the fire that becomes available to support combustion as the foam breaks down." '965 patent, 4:3–5. The Court construes "gas consisting essentially of nitrogen" and "nitrogen containing gas" to mean "gas containing mainly of nitrogen without other gases in sufficient concentrations to support combustion."

Even though there is no express disclaimer of air for the more broadly-claimed "gas comprising nitrogen," the patentee made clear throughout the specification that the invention does *not* use air. *See* '965 patent, 4:3–5; 4:48–53. The Court construes "gas comprising nitrogen" to mean "a gas, other than air, that includes nitrogen and may include additional gases that are not

present in sufficient concentrations to support combustion."

6. "directing" and "dispensing" terms

Disputed term	US Foam	Defendants
directing said stream Patent '965 Claims 1, 2	allowing a fluid or liquid that is moving to turn, move, or point undeviatingly or to follow a straight course with a particular destination or object in view	injecting or placing the expanded foam on a fire
directing Patent '965 Claim 1	allowing to turn, move, or point undeviatingly or to follow a straight course with a particular destination or object in view	flowing the nitrogen aerated liquid foam generating solution as described in the '443 Patent, Column 3, Lines 47-60 and in the '375 Patent, Column 3, Lines 33-42
directs said expanded foam fire suppressant … through said at least one ingress point Patent '965 Claim 13	allows a mixture of nitrogen and foam concentrate/liquid mixture to turn, move, or point undeviatingly or to follow a straight course through at least one entrance	Injecting or placing on a fire through a borehole
directs Patent '965 Claim 13	allows to turn, move, or point undeviatingly or to follow a straight course with a particular destination or object in view	injected or placed on a fire
dispenser	an apparatus that allows fluid to be discharged	an injector that places the expanded foam on a fire
dispensing a fire suppressant comprising a chilled nitrogen expanded foam Patent '336 Claim 8	discharging a fire suppressant that includes a foam concentrate/liquid mixture gasified with chilled nitrogen and may include additional substances	Injecting or placing a low temperature nitrogen gasified foam on a fire sealed in a coal mine

Disputed term	US Foam	Defendants
dispensing a fire suppressant comprising chilled nitrogen expanded foam to said sealed portion of said confined area Patent '336 Claim 8	discharging a fire suppressant comprising chilled nitrogen expanded foam to said sealed portion of said confined area	Injecting or placing a low temperature nitrogen gasified foam on a fire sealed in a coal mine
dispensing Patent '336 Claims 1, 4 Patent '965 Claim 4	discharging	injecting or placing upon

The parties have already agreed that "dispensed" means "discharged" and "dispensing" means "discharging." Defendants equate "directing" with "dispensing" without explanation. Different words are presumed to have different meanings. *See Anderson Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1369 (Fed. Cir. 2007). There is no evidence in the intrinsic record to assist the Court in determining the meaning of direct, so the Court resorts to a dictionary. As used in the claims, "directs" means "to dispatch, aim, or guide along a fixed path." *See* WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED 640 (1993) ("to dispatch, aim, or guide usu. along a fixed path").

Dispenser appears by itself only in claims 11 and 13 of the '965 patent. Claim 11 recites, "wherein said expanded foam fire suppressant is expanded by a dispenser that proportions nitrogen containing gas into a water/foam concentrate stream thereby to initiate expansion of said foam." '965, Claim 11. The dispenser of claim 11 operates exactly as the diffuser/dispenser described in

the specification; the apparatus expands and discharges the foam. *See* '965 patent, 4:62–65. The Court construes dispenser to mean "an apparatus that expands and discharges foam."

7. "foam"- related terms

Disputed term	US Foam	Defendants
chilled nitrogen expanded foam Patent '336 Claims 1, 2, 3, 8, 9, 10, 12	foam concentrate/liquid mixture gasified with chilled nitrogen	to lower the temperature; to cool as compressed nitrogen is chilled when released as it expands the foam concentrate/liquid mixture as mixed with chilled nitrogen, as described in the '443 Patent at Column 3, Lines 47-60 and in the '375 Patent, Column 3, Lines 39-41
class A type foam concentrate Patent '336 Claim 13	a foam concentrate for extinguishing fires involving ordinary combustible materials, such as wood, cloth, paper, rubber, as well as many plastic	readily available commercial foaming agents; foaming agents used in fire fighting (A.F.F.F., high expansion foam, protein foam), sulfate soap, or common dishwashing detergents as described in the '375 Patent, Column 3, Lines 4-10
expand said foam concentrate Patent '965 Claims 1, 9	increase the volume of the foamable substance	increase volume by gasification
expanded foam fire suppressant Patent '965 Claims 1, 2, 11, 13	a mixture of nitrogen and foam concentrate/liquid mixture	an expanded nitrogen aerated liquid foam generating solution as described in the '443 Patent, Column 3, Line 61 thru Column 4, Line 3 and in the '375 Patent, Column 3, Lines 43-62
expanded foam Patent '336 Claim 1 Patent '965 Claims 1, 2, 4, 13	a mixture of nitrogen and foam concentrate/liquid mixture	foam gasified with a gas or an evaporated liquid
foam concentrate/liquid mixture Patent '336 Claims 1, 3 Patent '965 Claims 1, 9	a mixture of foam concentrate and a non-flammable liquid	a foamable solution mixed together with a non-flammable fluid

Disputed term	US Foam	Defendants
foam concentrate Patent '336 Claims 1, 2, 13, 14 Patent '965 Claims 1, 4, 9	a foamable substance	a foamable solution
nitrogen expanded foam chilled fire suppressant Patent '336 Claim 1	mixture of chilled nitrogen and foam concentrate/liquid mixture	foam gasified with low- temperature nitrogen that is used to extinguish a fire
nitrogen expanded foam fire suppressant Patent '965 Claim 4	a mixture of nitrogen and foam concentrate/liquid mixture	an expanded nitrogen aerated liquid foam generating solution as described in the '443 Patent, Column 3, Line 61 thru Column 4, Line 3 and in the '375 Patent, Column 3, Lines 43-62
nitrogen expanded foam Patent '336 Claims 1, 2, 3, 8, 9, 10, 12	foam concentrate/liquid mixture gasified with nitrogen	foam gasified with nitrogen
nonflammable liquid Patent '336 Claims 1, 13 Patent '965 Claims 1, 4, 9	a fluid or liquid that is not easily ignited	a non-combustible fluid

The parties dispute whether expanded foam is merely a mixture or must be "gasified" or "aerated." US Foam relies on the ordinary meaning of "expand" to argue that to expand foam is "to increase the volume of" foam. The chart above lists the disputed terms as the parties identified them. The Court distills the voluminous collection of disputed terms to the following list:

- Chilled nitrogen expanded foam
- Expanded foam fire suppressant
- Expand said foam concentrate
- Class A type foam concentrate

- Nonflammable liquid
- Foam concentrate/liquid mixture
- Foam concentrate

The parties dispute whether foam concentrate can be a substance (i.e., one type of material), or must be a solution (i.e., a mixture of two or more liquids). Nothing in the claims, specification, or prosecution history suggest that a foam concentrate is limited to a solution. Substance encompasses a solution as well as any other single-substance foam concentrate, such as a powder. The Court construes "foam concentrate" to mean "foamable substance."

The parties essentially agree to the definition of "foam concentrate/liquid mixture." The Court construes "foam concentrate/liquid mixture" to mean "foamable substance mixed with non-flammable liquid."

With respect to the "expanded" terms, US Foam offers ordinary meaning arguments that are not helpful to the Court. US Foam asserts that "nitrogen expanded foam" is "gasified with nitrogen," but does not agree that "expanded foam" is gasified at all. The foam, as taught by the claims and specification, is gasified; it becomes foam through the gasification or aeration process. What is novel about the invention, according to the patentee, is not simply that it expands foam (i.e., increases it in size). The invention's novelty is that it expands foam by gasifying it without adding oxygen to the site of a fire. To construe "expand" without tying it to the foam creation process—gasification—would impermissibly broaden the scope of the claims. The parties agree that, at least as used in the disputed phrase "expand said foam concentrate," the word "expand" means "to increase in volume." Therefore, "expanded foam fire suppressant" is construed to mean "foam concentrate/liquid mixture that is increased in volume by gasifying it with said

nitrogen." The Court construes "expand said foam concentrate" to mean "to increase the volume of said foam concentrate by gasifying it with said nitrogen." The parties agree that "chilled" means "lowered in temperature." The Court therefore construes "chilled nitrogen expanded foam" to mean "foam that is lowered in temperature and increased in volume by gasifying it with nitrogen".

The parties dispute whether "Class A type foam concentrate" should be defined by what it is or what it does. US Foam argues that Class A fires are those involving "ordinary combustible materials," and a Class A foam concentrate is one that is suitable for extinguishing those types of fires. Defendants argue that the construction should specify the types of agents that extinguish Class A fires. If the patentee wanted to identify specific agents, he was free to draft the claims in such a manner. Rather, the patentee drafted the claim to identify foam by the fire class for which it is intended. The patentee is entitled to broadly claim his invention so that he captures all manner of agents without having to identify each individually.

US Foam uses a flawed approach toward reading the dictionary definition. US Foam takes the meaning of Class A and tries to add additional materials that were not included in the original definition: "rubber, as well as many plastic[s]." The complete sentence in the definition reads, "Class A includes fires in combustible materials, such as wood, paper, and cloth where the quenching and cooling effect of quantities of water or of solutions containing a high percentage of water is of first importance." The Court will use the complete definition and construe "class A type foam concentrate" to mean "a foam concentrate that is suitable for extinguishing Class A fires, which include fires in combustible materials, such as wood, paper, and cloth where the quenching and cooling effect of quantities of water or of solutions containing a high percentage of

water is of first importance."

The parties have not briefed "nonflammable liquid." The definition for "nonflammable" is "incapable of being easily ignited and of burning with extreme rapidity." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED 1537 (1993). The Court construes "non-flammable liquid" to mean "a liquid that is incapable of being easily ignited and of burning with extreme rapidity."'

8. "mixing" and "introducing" terms

Disputed term	US Foam	Defendants
introduce said chilled nitrogen expanded foam Patent '336 Claim 1	allowing to be added said chilled nitrogen expanded foam	inject or place foam on a fire
introduce Patent '336 Claim 1	allow to be added	inject or place foam on a fire
introducing a gas comprising nitrogen under pressure to said stream Patent '965 Claims 1, 9	allowing to be added to said stream a gas, other than air, that includes nitrogen and may include additional gases under pressure	adding compressed nitrogen to the liquid stream
introducing a gas consisting essentially of nitrogen under pressure Patent '965 Claim 4	allowing to be added a gas consisting essentially of nitrogen under pressure	adding compressed nitrogen to a liquid stream
introducing Patent '965 Claims 1, 4, 9	allowing to be added	mixing as described in the '443 Patent, Column 2, Lines 67-68 and Column 3, Lines 1-3, 30-46 and 60-68 and in the '375 Patent, Column 3, Lines 33-42
mixing said nitrogen Patent '336 Claim 1	combining nitrogen	combining nitrogen with another substance

Disputed term	US Foam	Defendants
mixing Patent '336 Claim 1	allowing the bringing together of	introducing a gaseous aeration agent into a liquid foam generating solution as described in the '443 Patent, Column 3, Lines 60-68, Column 5, Lines 25-29 and in the '375 Patent, Column 3, Lines 33-42

For the identified "mixing" and "introducing" terms, the Court need only construe "mixing" and "introducing." The remainder of the identified phrases does not require construction because the Court is construing the constituent terms.

The parties propose wildly different constructions for "mixing," neither of which can be correct. US Foam proposes a definition that *allows* mixing to take place but does not require the step. Defendants argue that US Foam's use of "allowing" writes the step out of the claim. Defendants offer proposals, on the other hand, with an eye toward their invalidity case as their definitions incorporate pinpoint cites to unrelated prior art patents. The Court cannot adopt a construction that lacks intrinsic support and also invalidates the claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1327 (Fed. Cir. 2005) (en banc) ("[W]e have limited the maxim [of construing a claim to preserve its validity] to cases in which 'the court concludes, after applying all the available tools of claim construction, that the claim is still ambiguous.'" (quoting *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 911 (Fed. Cir. 2004))).

The Court sees from comparing the proposals that the parties agree that "mixing said nitrogen" means, at least in part, "combining nitrogen." As terms should be given the same meaning across different claims in a patent, *see Paragon Solutions, LLC v. Timex Corp.*, 566 F.3d 1075, 1087 (Fed. Cir. 2007) (quoting *PODS, Inc. v. Porta Stor, Inc.*, 484 F.3d 1359, 1366 (Fed. Cir. 2007)). The Court construes "mixing" to mean "combining." Likewise, the parties agree, at

least in part, that "introducing" means "adding." The Court construes "introducing" to mean "adding" and "introduce" means "add."

9. "stream"- related terms

Disputed term	US Foam	Defendants
creating a flowing stream Patent '965 Claim 4	allowing a fluid or liquid that is moving to be brought into existence and causing said fluid or liquid to flow	pressurizing a foamable solution to cause it to flow as described in the '443 Patent, Column 3, Lines 46-68 and in the '375 Patent, Column 3, Lines 28-42
into a stream Patent '965 Claim 1	into a fluid or liquid that is moving	the addition of a foamable agent into pressurized water as described in the '443 Patent, Column 2, Lines 49-53 and in the '375 Patent, Column 3, Lines 1-13
said stream Patent '965 Claim 3	said fluid or liquid that is moving	the addition of a foamable agent into pressurized water as described in the '443 Patent, Column 2, Lines 49-53 and in the '375 Patent, Column 3, Lines 1-13
stream of foam concentrate/liquid mixture Patent '965 Claim 9	a mixture of foam concentrate/liquid mixture that is moving	the addition of a foamable agent into pressurized water and pressurizing the foamable solution to cause it to flow
stream of foam fire suppressant Patent '965 Claims 1, 9	mixture of nitrogen and foam concentrate/liquid mixture that is moving	a moving flow of gasified fire fighting foam

The parties agree that "stream" means "a fluid or liquid that is moving." Defendants argue that the movement must come from pressurization and not gravity. The claims already recite pressure limitations. For example, the '965 patent, Claim 1 recites that "nitrogen under pressure" is added to the foam concentrate mixture to create the fire suppressant foam. *See* also '965 patent, claim 4 ("said flowing stream being maintained at a pressure of at least 90 psi, introducing a gas consisting essentially of nitrogen under pressure of at least 100 psi . . . ."); '965 patent, claim 9

("introducing a gas comprising nitrogen under pressure"). Defendants' proposal adds an unnecessary limitation.

The Court adopts the following constructions:

creating a flowing stream	making a flowing stream
into a stream	into a stream
said stream	said stream
stream of foam concentrate/liquid mixture	stream of foam concentrate/liquid mixture
stream of foam fire suppressant	moving flow of expanded foam fire suppressant

10. "chilling"-related terms

Disputed term	US Foam	Defendants
chilled prior to admixture Patent '336 Claim 3	chilled prior to the act of mixing	to cool or have cooled to a cold temperature or liquid phase before the foam concentrate is being mixed with nitrogen
chilling nitrogen gas Patent '336 Claim 1	lowering the temperature of nitrogen gas	to cool or have cooled to a cold temperature or liquid phase

The parties agree that "chilling" means "lowering the temperature" and that "chilled" means "lowered in temperature." The Court incorporates the parties' agreement and adopts the following constructions:

chilled prior to admixture	lowered in temperature prior to the act of mixing
chilling nitrogen gas	lowering the temperature of nitrogen gas

11. "proportioning" terms

Disputed term	US Foam	Defendants
proportioned Patent '965 Claims 3, 12	adjusted in relation to the amount of other substances in the mixture	mixed in a measured amount
proportioning a foam concentrate into a stream of nonflammable liquid Patent '965 Claims 1, 9	allowing the amount of a foam concentrate to be adjusted in relation to the amount of nonflammable liquid in a stream	mixing the foamable solution with a noncombustible fluid in a measured amount
proportioning Patent '336 Claim 1 Patent '965 Claims 1, 4, 9	allowing the amount of a substance included within a mixture to be adjusted in relation to the amount of other substances in the mixture	mixing together in a measured amount
proportions Patent '965 Claim 11	Allows the amount of a substance included within a mixture to be adjusted in relation to the amount of other substances in the mixture	**[See Proportioned and Proportioning]**

The parties primarily dispute whether proportioning is permissible, rather than mandatory. They also dispute whether proportioning is "mixing in a measured amount" or "adjusting in relation to other [substances]." As previously explained, "allows" or "allowing" are not correct. What largely remains for the Court to decide is whether proportioning is adjusting or mixing.

The specification explains that proportioning foam concentrate and water can be accomplished by adjusting water pressure relative to foam concentrate. '336 patent, 7::59–65. It also explains that the foam concentrate and water can be pre-mixed in a container for small fires. '336 patent, 7:53–57. Claim 3 of the '965 patent recites specific pressures. The specification also explains that the foam concentrate are combined as ratios: "The foam concentrate . . . is

normally proportioned with water in percentages ranging from about 0.1% by volume foam concentrate to about 1% by volume foam concentrate." '336 patent, 7:44–51. *See also* '965 patent, 4:28–31 ("The foam concentrate is proportioned with water in percentages ranging from about 0.1% by volume to about 1% by volume depending on the hardness of the water."). Claim 6 of the '965 patent also recites specific percentages.

Looking to the claim language, the relevant limitations use "proportioning . . . into" to produce a mixture. For example, Claims 1 and 9 of the '965 patent recite, "proportioning a foam concentrate into a stream of non-flammable liquid to form a stream of foam concentrate/liquid mixture." Defendants' verb of choice, "mixing," seems redundant considering the ultimate product is a "mixture." US Foam's verb choice of "adjusting" is inappropriate for the pre-mixed embodiment. The verb "measuring," however, is instructive and more accurately describes how the foam concentrate/liquid mixture is created for each of the embodiments. The embodiments described include "premix[ing] the foam concentrate and water in a suitable container," Venturi "line proportioning devices" that measure the flow rate of the foam and water, and "'around the pump' proportioners." '336 patent, 7:51–8:15. The word "measuring" reflects premixing, adjusting the flow rate, and manipulating the concentrations, as recited in Claims 3 or 6.

The Court construes "proportioning" to mean "measuring," "proportioned" to mean "measured," and "proportions" to mean "measures."

12. "ingress" terms

Disputed term	US Foam	Defendants
one ingress point to said an area of said mine shaft involved in fire Patent '965 Claims 1, 9	an entrance to an area of a mine shaft that is on fire	borehole to the area of the coal mine on fire
one ingress point Patent '965 Claims 1, 9, 13	one entrance	borehole or other place where nitrogen expanded foam is injected or placed on a fire
through said at least one ingress point Patent '965 Claims 1, 9	through at least one entrance	the borehole where the expanded foam is placed on a fire
seal includes said at least one foam ingress point Patent '965 Claim 14	closure includes at least one entrance for the introduction of foam	an air tight fire-proof barrier to confine an area of the coal mine on fire, except for the ingress point identified in this claim

The parties have agreed that "ingress point," as recited in claim 1 of the '965 patent, means "an entrance." The parties appear to dispute these terms, but provide no argument for the Court to consider. Incorporating the parties' agreement regarding "ingress point" and its constructions for other constituent terms, the Court adopts the following constructions:

one ingress point	one entrance
through said at least one ingress point	through at least one entrance
seal includes said at least one foam ingress point	closure includes at least one entrance for the introduction of foam

13. Disputed terms that the parties have not briefed

Disputed term	US Foam	Defendants
flooding said area of said mine shaft involved in the fire with water Patent '965 Claim 2	allowing an area of the mine shaft that is on fire to be covered with water	to fully cover the coal mine fire with water prior to injecting or placing the foam mixture on the combustible material
forming Patent '336 Claims 1, 9	allowing to be made	producing a foamable solution as in the '375 Patent, Column 3, Lines 4-10 and Lines 21-23 and the '443 Patent, Column 3, Lines 60-68
providing Patent '965 Claims 1, 9	allowing to be supplied	constructing at least one entry point to the area of the mine involved in the fire
drawing out at least a portion of the ambient atmosphere from said area involved in fire after it has been sealed Patent '965 Claim 10	to remove at a minimum a part of the ambient atmosphere from an area that is on fire after it has been allowed to be made firmly closed or secured	removing air from the confined area involved with the mine fire
reduction of the surface temperature of combustible material in said sealed portion to about 90° F Patent '336 Claim 8	lowering of the surface temperature of material capable of burning in the sealed portion to approximately 90° F	in a coal mine fire, reducing the borehole temperatures to 90° F or less
thereby to lower the temperature at the surface of combustible material at said area Patent '336 Claim 1	to reduce the temperature at the surface of the combustible material at the area	to reduce the borehole temperature readings for the combustible material in the mine

Disputed term	US Foam	Defendants
substantially close off contact between combustible material involved in fire and ambient atmosphere Patent '965 Claim 4	close off contact or almost close off contact to material capable of burning	a layer of expanded foam between combustible material and the ambient atmosphere
substantially close off contact between combustible material involved in fire and ambient atmosphere Patent '965 Claim 4	close off contact or almost close off contact between the ambient atmosphere and the material capable of burning that is on fire	to seal a confined area of a coal mine involved with a fire

For seven disputed terms and phrases, the parties failed to help the Court understand their positions with the benefit of briefing or oral argument. Even though the parties have not identified the substance of their positions or the real dispute, the Court must nonetheless fulfill its duty to determine the proper scope of the claims. *See O2 Micro Intern. Ltd. v. Beyond Innovation Technology Co., Ltd.*, 521 F.3d 1351, 1360–61 (Fed. Cir. 2008) (requiring the Court to resolve all real disputes because "claim construction requires the court to determine what claim scope is appropriate in the context of the patens-in-suit").

As with other terms, three of US Foam's proposals use "allowing," suggesting that certain steps of the methods need only be permitted and not necessarily be performed. The Court rejects any construction that transforms a required method step into an optional one. The Court will not include "allowing" in its construction for these terms.

Defendants' proposal for the "flooding" term incorporates the remainder of the claim limitation into the disputed phrase. Claim 2 of the '965 patent reads, "The method of claim 1

further including the step of flooding said are of said mine shaft involved in the fire with water prior to directing said stream containing said expanded foam fire suppressant." '965 Patent, claim 2. The additional phrase, "prior to injecting or placing the foam mixture on the combustible material" in Defendants' proposal merely restates the remainder of the claim. The parties also appear to dispute whether flooding requires that the mine shaft be "fully" covered. US Foam relies on a dictionary definition, but chooses the one definition that requires the least amount of water. For example, other definitions recite "to become filled to excess with some fluid", "to cover or overwhelm", or "to fill more or less completely with water or other fluid." Based on both parties proposed terms, however, the parties apparently agree that the mine shaft must be covered with water and need not be filled with water. The Court construes "flooding said area of said mine shaft involved in the fire with water" to mean "covering the surfaces of the mine shaft that are on fire with water."

Defendants' proposal for "forming" impermissibly relies upon other, unrelated patents. The definition of "form" is "to give form or shape to : FRAME, CONSTRUCT, MAKE, FASHION." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED 893 (1993). The Court construes "forming" to mean "making or constructing."

Defendants' proposal for "providing" incorporates the remainder of the claim limitation into the definition of providing. Claim 1 of the '965 patent recites "providing at least one ingress point to said an area of said mine shaft involved in fire." Defendants' proposal would make the trailing language superfluous. US Foam's use of "allowing" is equally impermissible. The parties also dispute whether an ingress point is "constructed" or "supplied." They offer little assistance to the Court on this point. The specification uses the word "constructing" with respect to the seals,

which is where the ingress point is located in at least one embodiment. '336 patent, 4:46–47. In the first example, the specification explains that water pipes served as the ingress point and were "installed." '336 patent, 8:34–51. The definition of "provide" is "to supply for use." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED 1827 (1993). While constructing may be appropriate in some scenarios, constructing is narrower than supplying as it implies more planning and labor than supplying. The Court can envision supplying a hole in a mine without constructing it. The Court construes "providing" to mean "supplying."

With respect to the "drawing out" phrase, the Court has construed all of the constituent terms except the phrase "drawing out at least a portion of the ambient atmosphere." The parties agree that "to draw out" means "to remove." The parties appear to dispute whether "ambient atmosphere" means "air." US Foam did not offer a definition for "ambient atmosphere" while Defendants propose "air." The specification explains that the conventional method of fighting a coal mine fire includes the step of "drawing out as much air as possible from the involved areas." '336 patent, 4:49–50. Later, it explains that "it is preferred that the atmosphere in the sealed area is drawn out so as to reduce as much as possible the oxygen in the sealed area to limit or slow the progress of the fire." '336 patent, 5:4–8. The remainder of Claim 10 of the '965 patent further explains that the purpose of the "drawing out" is to "thereby . . . reduce the amount of oxygen and gaseous fuel available to the fire." '965 patent, claim 10. Although conventionally the method would draw out air, the patentee chose not to so limit his invention to a single type of gaseous fuel. The Court construes "drawing out at least a portion of the ambient atmosphere" to mean "removing at least some of the ambient atmosphere, such as air, from said area involved in fire

after it has been sealed."

The parties appear to dispute, for the two "surface temperature" claim limitations whether the temperature must be measured using a borehole reading. Defendants offer extrinsic evidence to support their proposal that the temperature readings can be made only at a borehole. Nowhere in the claims or specification, or as far as the Court can determine, in the prosecution history does the patentee use the word "borehole." Necessary to the invention is the reduction in temperature of the surface of the coal mine, not the borehole. The Court construes "reduction of the surface temperature of combustible material in said sealed portion to about 90° F" to mean "lowering of the surface temperature of material capable of burning in the sealed portion to approximately 90° F." The Court construes "thereby to lower the temperature at the surface of combustible material at said area" to mean "in order to lower the temperature at the surface of the combustible material at said area."

The parties dispute the meaning of the phrase "substantially close off contact between combustible material involved in fire and ambient atmosphere," each party offering two different constructions for this term. Defendants argue that "substantially close off contact" means the same thing as seal. Claim 4 of the '965 patent teaches that the expanded foam fire suppressant is what "substantially closes off contact" between the atmosphere and the burning material. '965 patent, claim 4. There is no support for Defendants' proposal that the foam creates a seal. The foam creates a barrier to prevent air, or other gaseous fuel, from feeding the fire. The Court construes "substantially close off contact between combustible material involved in fire and ambient atmosphere" to mean "create a barrier between combustible material involved in fire and ambient atmosphere."

B. The '558 patent

1. "a fire extinguishing chemical of a gas type that comprises argon and nitrogen"

Disputed term	On Site	US Foam
a fire extinguishing chemical of a gas type that comprises argon and nitrogen Claims 1, 6	A gas that contains argon and nitrogen, optionally with other components	A fire extinguishing chemical of a gas type that includes nitrogen and argon and may include additional gases, however the source of the argon is a source other than the argon that is isolated from air during generation of the nitrogen.

The parties dispute whether the gas must include nitrogen and argon, and whether the argon gas, if included, must have an independent source. On Site relies on the specification to argue that the fire extinguishing chemical can use a gas that is selected from argon, nitrogen, or other component. *See* '558 patent, 1:46–59. On Site also argues that neither the claims nor the specification require limiting argon to an independent source.

US Foam argues that the patentee disavowed the scope of a nitrogen-air mixture when it amended the claims to overcome prior art. As originally drafted, the claim recited "a fire extinguishing chemical of a gas type comprising at least one member selected from a group consisting of argon, nitrogen, and carbon dioxide." Amendment, February 25, 2005, at p. 2. The patentee amended the claim to overcome the examiner's rejection because "[the prior art reference] shows a device and teaches [a] method of extinguishing a fire using a gas type chemical, nitrogen using a foam formed by water containing a synthetic surface-active agent." Office Action, Nov. 29, 2004, at 4. Amending the claim, the patentee distinguished over the prior art reference, explaining that it "fails to disclose the use of a fire extinguishing chemical that comprises argon and nitrogen." Amendment, Feb. 25, 2005, at 9–10. US Foam argues that On

Site's proposal would permit air, which would recapture the prior art that included a nitrogen-air mixture.

"Just as prosecution history estoppel may act to estop an equivalence argument under the doctrine of equivalents, positions taken before the PTO may bar an inconsistent position on claim construction under § 112, ¶ 6." *Ballard Medical Products v. Allegiance Healthcare Corp.*, 268 F.3d 1352, 1359 (Fed. Cir. 2001) (quoting *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1457 (Fed. Cir. 1998)). According to the examiner, the prior art taught mixing nitrogen with the air, such that "the addition of the nitrogen into the system would inherently reduce the oxygen concentration below 21% and would normally reduce the[] oxygen concentration to ranges claimed." Office Action, Dec. 1, 2004, at 4. [Dkt. 76-7] The patentee amended the claims to require nitrogen and argon and explained that the prior art did not disclose using both nitrogen and argon to reduce the concentration of oxygen. If the argon in this limitation was the argon in air, then the argon would serve no purpose to reduce the concentration of oxygen as it would necessarily be accompanied by the oxygen in gas. The Court agrees that the gas cannot be air. The Court finds no support for US Foam's proposal, however, that further limits the source of the argon such that it cannot be created or generated from the air. The Court construes the phrase to mean, "a gas other than air that contains argon and nitrogen, optionally with other components."

2. "foams have the strength in such an extent that, after they have discharged, they are not broken until reaching a fire and, upon contact to the fire, they are broken"

Disputed term	On Site	US Foam
foams have the strength in such an extent that, after they have discharged, they are not broken until reaching a fire and, upon contact to the fire, they are broken Claim 2	The cells of the expanded foam survive being discharged, but break up upon making contact with fire.	The foams have sufficient structural integrity to resist breaking apart after being discharged and before reaching the fire thus allowing the foams to carry the gas to the fire, but lack the structural integrity to resist breaking apart upon contact with the fire and break apart upon contact with the fire thus releasing the gas contained in the foam, which then extinguishes the fire

The parties dispute the purpose of the cells. US Foam argues that the foam is created, "thus releasing the gas contained in the foam, which then extinguishes the fire." On Site uses the word "cells" to describe the structure of the foam, with which US Foam disagrees. At the hearing, the parties conceded that the proposals meant essentially the same thing. The Court construes the phrase to mean "the structural integrity of the foam bubbles is strong enough to survive being discharged, but weak enough to break apart after making contact with fire."

VI. Conclusion

The court adopts the constructions set forth in this opinion for the disputed terms of the '965, '336, and '558 patents. The parties are ordered that they may not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the court.

It is SO ORDERED.

SIGNED this 3rd day of August, 2010.

T. JOHN WARD
UNITED STATES DISTRICT JUDGE