Trickle Research

Every raging river, every great lake, every deep blue sea starts … with a trickle

Research Update

BioSig Technologies, Inc.

(NasdaqCM: BSGM)

Report Date: 12/09/21

12- 24 month Price Target: $8.25

Allocation: 4

Closing Stock Px at Initiation (Closing Px:04 /03/20): $5.14

Closing Stock Px at Allocation Downgrade (Closing Px:05 /13/20): $10.99

Closing Stock Px at Allocation Upgrade and Target Downgrade (Closing Px:11/19/20): $4.08

Closing Stock Px at Allocation Upgrade (Closing Px:04/16/21): $3.88

Closing Stock Px at This Update (Closing Px:12/08/21): $2.75

Prepared By:
David L. Lavigne
Senior Analyst, Managing Partner
Trickle Research

Disclosure: Portions of this report are excerpted from BioSig's filings, website(s), presentations or other public collateral. We have attempted to identify those excerpts by *italicizing* them in the text.

We started covering BioSig about 18 months ago, and there were some extraordinary events around that coverage that caused the stock to trade through our original price target of $10.50, which in turn led to us reducing our allocation. Those events are documented in some of the prior research so we will not rehash them here but the story today is largely driven by our original/primary reasons for initiating the coverage in the first place so we will focus on that and more specifically some of the parts to the story that we see as most germane to the Company's future.

Just to briefly recap for those who are new to the story or may not be up to speed, BioSig's flagship product and/or technology is referred to as PURE EP™. The Company spent the better part of 10 years developing the technology and received FDA 510(k) clearance for the device in 2018. Again to refresh, Company collateral describes the device as follows:

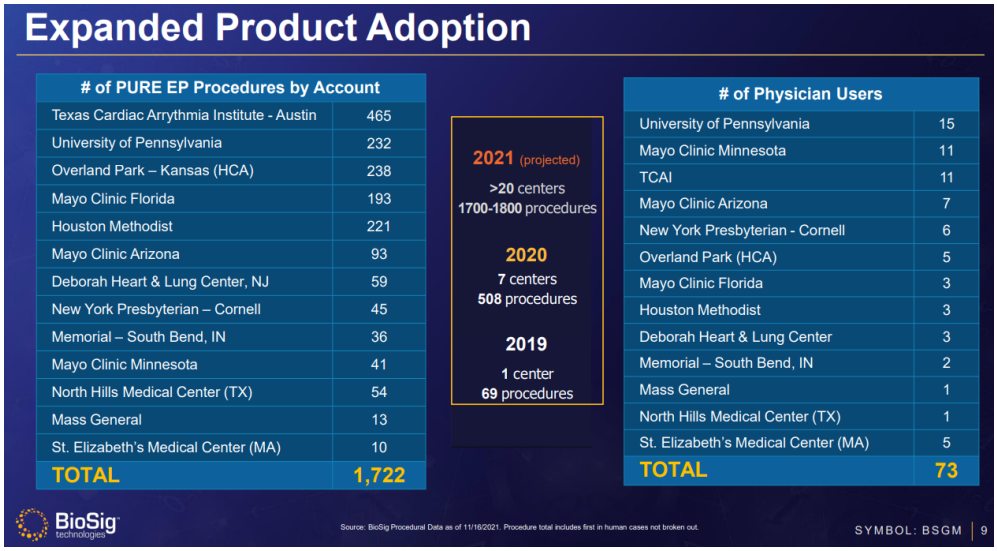
> *PURE EP™ is a signal processing platform that combines advanced hardware and software to address known challenges associated to signal acquisition, to enable electrophysiologists to see more signals and analyze them in real-time. The device aims to minimize noise and artifacts from cardiac recordings and acquire high-fidelity cardiac signals. Improving fidelity of acquired cardiac signals may potentially increase the diagnostic value of these signals, thereby possibly improving accuracy and efficiency of the EP studies and ablation procedures.*
>
> *Our initial focus is on improving intracardiac signal acquisition and enhancing diagnostic information for catheter ablation procedures for complex arrhythmias like ventricular tachycardia ("VT"), a potentially life-threatening arrhythmia, and atrial fibrillation ("AF"), the most common cardiac arrhythmia associated with a fivefold risk of stroke.*
>
> *Cardiac catheter ablation is a procedure that involves delivery of energy through the tip of a catheter that scars or destroys heart tissue to correct heart rhythm disturbances. PURE EP™ is designed to address long-standing limitations that slow and disrupt cardiac catheter ablation procedures, such as environmental lab noise, signal saturation, slow signal recovery, and inaccurate display of fractionated potentials.*

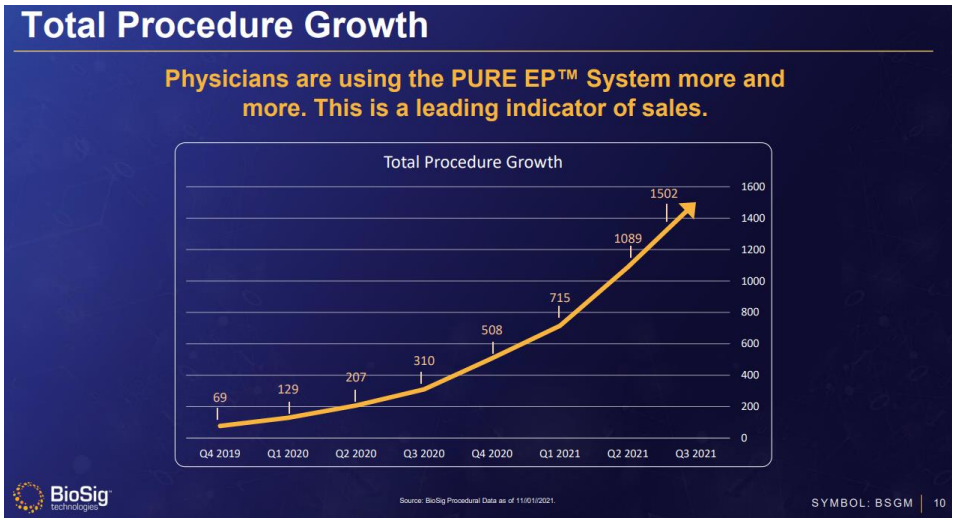
In terms of BioSig's addressable market, industry data indicate that there are approximation 7,300 electrophysiology labs in the word, of which approximately 3,400 are in the U.S. Industry estimates suggest those labs will perform 1.45 million ablations worldwide in 2022. The Company's goal is to sell their PURE EP™ into as many of those labs as possible, at a price tag of something around $200,000 per unit including installation etc., which means the total addressable domestic market is something between $600 - $700 million. They are seeking to obtain CE Mark approval as well, which would for the most part, double that TAM. In addition, the Company has built a recurring annual service/maintenance piece into the platform, and they are also working on layering both software and data analytics models onto the platform. Obviously, the value of those ancillary pieces depends on BioSig's ability to drive initial adoption of the platform and expand the installed base, which brings us to our next point.

We had heard the BioSig story on several occasions and quite some time prior to our initiation. As we many of the companies we review, there were (from our perspective) some positives and some negatives. One of the clear positives, certainly in terms of medical device deals, was that it already had its FDA (510k) approval, which meant that one of the key risks associated with early-stage pharma and/or device companies was behind them. That said, post approval, selling the technology to EP labs has proven to be more difficult than we (and we suspect *they*) anticipated.

First, the sales efforts have clearly been impacted by the pandemic, the start of which coincided roughly with our initiation. That has certainly been an appropriate excuse for most businesses, and we do not think BioSig is an exception. Certainly, selling a new/expensive piece of medical equipment that helps EP's perform ablations in an

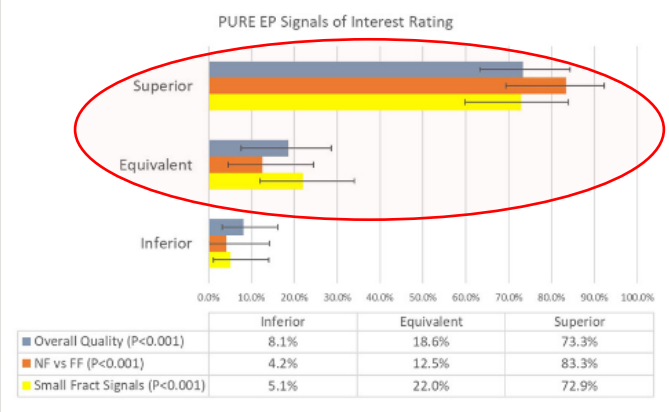
environment where elective surgeries were being postponed to free up hospital space for Covid patients is not an easy hill to climb. Keep in mind, AF can be alternatively treated with medication, so we are guessing that ablation procedures were probably down through 2020 making BioSig's pitch that much more difficult. On the other hand, as BioSig's most recent presentation notes, during 2020 the Company did manage to place trial systems in several prominent centers that in turn performed 508 *PURE EP*™ assisted procedures. Moreover, through 2021 that momentum accelerated considerably in terms of both added centers and added procedures:





In addition to the accelerating procedures, the Company recently released results from a clinical study: ***"Evaluation of a novel cardiac signal processing system for electrophysiology procedures: the PURE EP 2.0 study"***, which has been published in the Journal of Cardiovascular Electrophysiology (Evaluation of a novel cardiac signal processing system for electrophysiology procedures: The PURE EP 2.0 study - Al-Ahmad - 2021 - Journal of Cardiovascular Electrophysiology - Wiley Online Library). That study provides clinical support for the Company's assertion that PURE EP™ provides considerably better signal quality than legacy industry signaling systems. Below are some excerpts from that study that illustrate the superiority:

PURE signals were statistically rated better for overall signal quality when compared to conventional sources 73% of the time ($p < .001$). The blinded reviewers were more confident in discerning NF versus FF signal components on PURE when compared to conventional systems 83% of the time ($p < .001$). The PURE system produced superior small, fractionated signals of clinical significance 73% of the time ($p < .001$) (Figure 6). We found a similar trend in the samples that evaluated recovery to baseline after pacing or cardioversion, as well as the samples for signal quality during RF, however, the number of samples in these two categories were too small for statistical analysis.

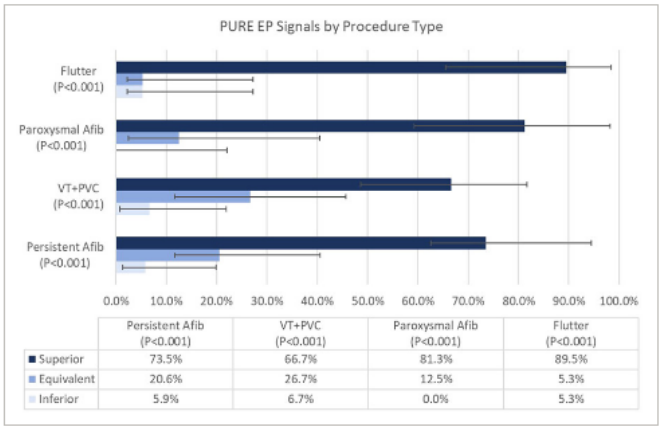


	Inferior	Equivalent	Superior
Overall Quality (P<0.001)	8.1%	18.6%	73.3%
NF vs FF (P<0.001)	4.2%	12.5%	83.3%
Small Fract Signals (P<0.001)	5.1%	22.0%	72.9%

Figure 6 Open in figure viewer | PowerPoint

PURE signals were rated statistically better in (3) signal categories: overall signal quality, ability to discern near-field from far-field signal components, and clinical value of small/fractionated signals

Furthermore, across all types of ablation procedures, clinically important intracardiac signals acquired by the PURE system were statistically rated better than matching signals from conventional systems ($p < .001$) (Figure 7). In Persistent AF, Paroxysmal AF, PVC, VT, and Atypical Aflutter PURE signals were rated superior 74%, 81%, 67%, and 90% of the time, respectively.



	Persistent Afib (P<0.001)	VT+PVC (P<0.001)	Paroxysmal Afib (P<0.001)	Flutter (P<0.001)
Superior	73.5%	66.7%	81.3%	89.5%
Equivalent	20.6%	26.7%	12.5%	5.3%
Inferior	5.9%	6.7%	0.0%	5.3%

Figure 7 Open in figure viewer | PowerPoint

PURE signals were rated statistically better regardless of the type of ablation procedure

Revisiting our original thesis, our enthusiasm for BioSig stemmed from a handful of notions we gleaned from both macro and micro levels of the story. For instance, aging demographic and related comorbidity data indicate growing demand for ablation procedures in general. More specifically to BioSig, conclusions like those from the study above suggest that PURE EP™ provides better visual signal support to EP's, which ostensibly may increase the efficiency of the procedures as well as make them safer and less likely to require repeat procedures. As we have suggested in multiple pieces of past research regarding a handful of technologies in a corresponding handful of industries, the adoption of a "better mousetrap" is often preceded and supported by data that demonstrate and support its advantages and/or superiority to the status quo. We think that is especially true when the application of the technology involves critical endeavors (fixing someone's heart), because when those endeavors end with

poor outcomes people begin to ask if that outcome could have been different if available (better) technologies had been utilized. In many cases, that is how "standards of care" become standards. That is given the choice, we think most ablation patients would prefer to have their EP assisted by a technology that provides the best signal possible. In that regard, we think *PURE EP*™ provides multiple value-added attributes that in the aggregate could drive adoption initially by first mover and/or busier labs where some of those attributes are more pronounced, but also thereafter in EP Labs that may be forced to keep pace with emerging standards.

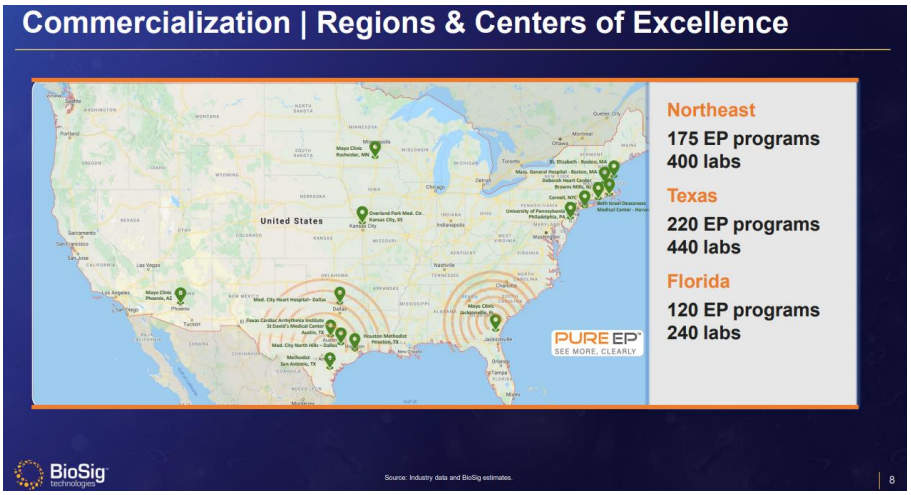
In retrospect, while certainly some of the Company's sales process has been compromised by Covid19, we think its also fair to suggest that process was probably in need of additional evangelization regardless of the pandemic. To that point, the Company has spent a good part of the past 12-18 month evangelizing and we think we are approaching a point where we should start seeing the impact of those efforts.

Recognize, as the illustrations above note, the Company currently has installed systems in something around 20 centers. However, as the revenues indicate, their *actual sales* of units (which commenced in early 2021) include just a small handful. To date, we think the Company has been content to provide many of these centers with evaluation systems, first as a means of seeding/demonstrating the technology in these high-volume centers, and second to provide a platform to enable a significant number of procedures to support their efficacy studies. Succinctly, as the referenced study above supports, we think they have collected enough data and made a good case for the value of the platform, now it is time to start selling something. To that end, they recently announced the hiring of a seasoned industry sales executive as their "Chief Commercial Officer". That tells us they probably agree that it is time to start selling something and our sense is that they will likely start with the units that are already installed in the centers listed above. While again, we think the trial/evaluation installation approach has provided considerable value to the Company, we suspect the "evaluation" periods will be far more finite going forward. Again, we think the mantra here is transitioning from demonstrating and evangelizing to selling and calendar 2022 should provide some visibility into the success or failure of that transition.

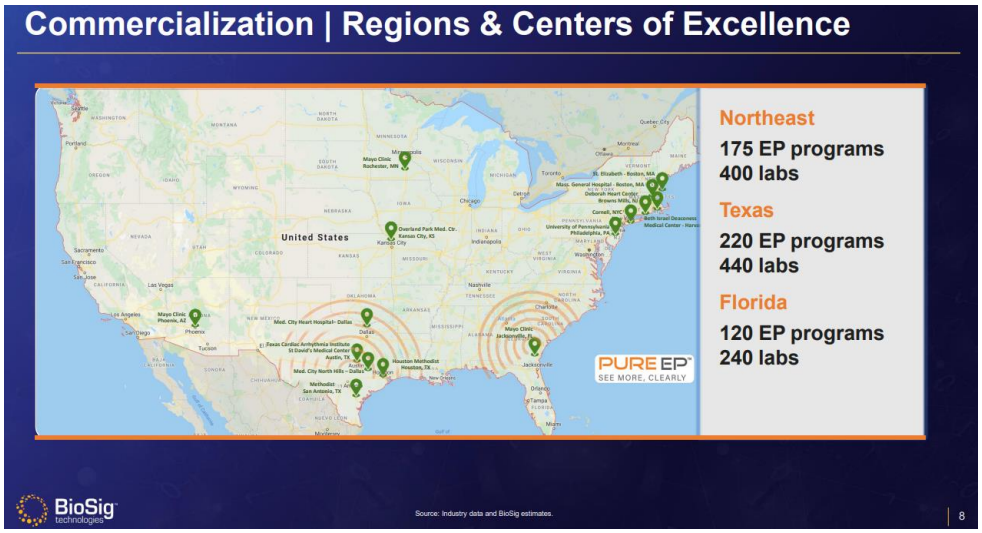
The above noted, here is our modeling rationale for the next several quarters.

We are modeling the sale of between 35 and 40 units through calendar 2022. As the illustrations above suggest, they currently have evaluation units in approximately 20 centers, and we believe several of those centers have multiple EP labs. Put another way, we think the Company could get well into our 2022 estimates by converting the evaluation units currently in the field into sales. Frankly, if they cannot convert a considerable portion of *these* into sales then in our view, we (they) may have to rethink the value proposition of PURE EP™.

Looking a bit further out, the Company provides the following graphic with respect to its primary (geographic) sales focus, and what they believe to be the addressable market(s) in those regions:



(To segue, a moment, notice in the graphic above, each of these regions include 2+ labs for every EP program, which supports our prior notion regarding multiple labs per center). Secondly, these regions of focus in conjunction with outlying areas where they have also established relationships (Mayo's locations for instance), represent about 1,100 EP labs, or approximately 1/3rd of all the U.S. labs. Our model assumes the sale of units into these labs (or a like number of domestic labs) over the next 7 years (by the end of calendar 2028). Succinctly, if it does not happen by then, its probably not going to happen. On the other hand, if PURE EP™ becomes a standard fixture in EP labs across the U.S. they would sell considerably more than 1,100 units.



As we alluded to above, in addition to the domestic markets, the Company is in the process of securing CE Mark approval which would allow for sales across much of Europe and ostensibly other international markets. We have not modeled that potential, but we do think that carries value that should be considered.

Lastly, in the initiating coverage we addressed other opportunities the Company is developing in "Bioelectronic Medicine". Revisiting *that* notion, Company collateral provides the follow:

> *Bioelectronic medicine is a rapidly growing field of healthcare that explores how targeted electrical signals can harness the body's natural mechanisms to diagnose and treat a range of diseases. The field represents not just a narrow category of medical devices, but an entire approach to detecting and treating disease – using electrical pulses and the body's own mechanisms as an adjunct or alternative to drugs and medical procedures.*
>
> *Bioelectronic medicine applications aim to deliver treatment breakthroughs for many diseases that currently have a high level of unmet need. Researchers and innovators are exploring the field's applications across various disease areas and disciplines, including neurology, auto-immune diseases, diabetes, arthritis, hypertension, pain management, cancer, and others. This wide range of applications sets bioelectronic medicine apart and indicates its immense potential.*
>
> *We know we're not alone in embracing a future with bioelectronic medicine. The field is making rapid strides, but this is just the beginning of what's possible. That's why we helped create the Alliance for Advancing Bioelectronic Medicine, an independent network of professionals dedicated to innovation at the intersection of healthcare and technology. We strive to develop this community with a common goal of realizing the field's full potential.*

Bioelectronic medicine is already a diverse, $20 billion market. It includes both familiar devices, such as pacemakers, as well as emerging technologies, such as vagus nerve stimulators and implantable neurostimulators. These exciting new segments are proliferating and attracting interest and investment from major players in technology and healthcare, such as Verily Life Sciences, Medtronic, and Johnson & Johnson.

As the field continues to develop, we believe our unique technology can play a critical enabling role. By providing more precise biomedical signals, our advanced signal processing capabilities can help clinicians better understand and change patterns to treat, or even prevent diseases.

As we note in the initiating coverage, we think the Company may have considerable opportunities in other applications of their technology in the bioelectronic medicine. We would add, as we understand it, they currently have R&D programs in conjunction with Mayo Clinical aimed at identifying and developing some of those opportunities. Here again, while we have not attempted to model or specifically value any of these endeavors, we believe they represent hidden value in the enterprise that could evolve into marked new valuation legs in the future. Again, we are not sure how to quantify that value just yet, but we think it is topical.

We submit, BioSig has encountered some challenges since our initiation in April 2020. Some of those have been systemic (the pandemic) while others have probably been more related to Murphy's Law (or whatever law says that most things in the microcap space end up taking more time than we think they will). On the other hand, as they have demonstrated in terms of the growth of their installed (albeit mostly evaluative) base, as well as their procedure growth, and their associated positive clinical evaluation results, the Company has managed to gain significant momentum. Now it is time to translate that momentum into sales. Our expectation is that 2022 (setting aside pandemics or other Black Swans) will be transformative in terms of that transition to sales. Obviously, our continued enthusiasm will likely hinge on the degree to which that notion materializes.

In terms of our targets, there are a few salient data points that require some color. First, when we initiated the coverage, we projected that by the end of 2021 share counts would increase by about 15% to 28.6 million shares outstanding. As it turned out that dilution bump looks like it is going to come in more like 40%. Of course, to that end, it goes without saying that if revenue is lower than anticipated (and the Company is burning cash) than more dilution than anticipated is a likely result. On the other hand, the Company ended September 30, 2021, with a cash a balance of $17.5 million, so certainly some of that dilution remains in cash. However, according to our current model assumptions, further meaningful dilution will be required to get BioSig to cash flow positive.

On the flip side of the negative impact of dilution on relative (per share) valuations, as we alluded to above, we think BioSig has at least three identifiable potential valuation catalysts that we have not attempted to model or otherwise include in or targets. Those catalysts include for instance, the impending CE Mark, the layering of software and other data analytic modules onto PURE EP™ and the further development of bioelectronic medicine technologies through NeuroClear. We suspect we will see more on each of those initiatives as we move forward.

To summarize, we remain constructive on BioSig's prospects, and we think some of the progress noted above supports that view. That said, while we believe the evaluation program they have deployed has provided marked value on multiple fronts, we also think it is time for that to begin to translate into sales. To reiterate, we expect 2022 to reflect that transition and if it does not, we may need to reassess our views regarding PURE EP's value proposition(s). The above considered, we are reiterating our allocation of 4 for the time being, although our inclination is to raise that in the face of the recent marked compression in the stock. In addition, despite our discussion around dilution are reiterating our 12-24 month price target of $8.25 with the recognition that it is on the high end of our range. We will reassess each of these as visibility dictates.

Projected Operating Model

BioSig Technologies, Inc.						
Projected Operating Overview						
By: Trickle Research LLC						
	(actual)	(actual)	(actual)	(estimate)	(estimate)	(estimate)
	3/31/2021	**6/30/2021**	**9/30/2021**	**12/31/2021**	**Fiscal 2021**	**Fiscal 2022**
Revenues:						
Unit Sales	$ 118,047	$ 207,000	$ 100,000	$ 190,000	$ 615,047	$ 7,220,000
Recurring Maintenance and Service Fees	$ -	$ -	$ -	$ -	$ -	$ 200,000
Other Revenue	$ -	$ -	$ 8,000	$ -	$ 8,000	$ -
	$ -	$ -	$ -	$ -		
Total Revenue	**$ 118,047**	**$ 207,000**	**$ 108,000**	**$ 190,000**	**$ 623,047**	**$ 7,420,000**
Cost of Goods	**$ 98,618**	**$ 62,000**	**$ 38,000**	**$ 40,000**	**$ 238,618**	**$ 1,406,000**
Gross Profit (Loss)	**$ 19,429**	**$ 145,000**	**$ 70,000**	**$ 150,000**	**$ 384,429**	**$ 6,014,000**
					$ -	$ -
Operating expenses:						
Research and development	$ 1,265,707	$ 1,667,000	$ 1,315,000	$ 1,405,700	$ 5,653,407	$ 5,822,600
General and administrative	$ 7,271,461	$ 6,480,000	$ 6,505,000	$ 6,413,800	$ 26,670,261	$ 26,128,400
Depreciation and amortization	$ 42,000	$ 49,000	$ 51,000	$ 51,102	$ 193,102	$ 205,432
Total operating expenses	**$ 8,579,168**	**$ 8,196,000**	**$ 7,871,000**	**$ 7,870,602**	**$ 32,516,770**	**$ 32,156,432**
Loss from operations	**$ (8,559,739)**	**$ (8,051,000)**	**$ (7,801,000)**	**$ (7,720,602)**	**$ (32,132,341)**	**$ (26,142,432)**
Other income (expense):					$ -	$ -
Gain on change in fair value of derivatives	$ -	$ -	$ 553,000	$ -	$ 553,000	$ -
Interest income	$ 1,000	$ -	$ 1,000	$ -	$ 2,000	$ -
Loss before income taxes	$ (8,558,739)	$ (8,051,000)	$ (7,247,000)	$ (7,720,602)	$ (31,577,341)	$ (26,142,432)
Income taxes (benefit)	$ -	$ -	$ -	$ -	$ -	$ -
Net loss	$ (8,558,739)	$ (8,051,000)	$ (7,247,000)	$ (7,720,602)	$ (31,577,341)	$ (26,142,432)
Preferred stock dividend	$ (2,000)	$ (3,000)	$ (2,000)	$ (4,700)	$ (11,700)	$ (18,800)
NET LOSS AVAILABLE TO COMMON STOCKHOLDERS	$ (8,560,739)	$ (8,054,000)	$ (7,249,000)	$ (7,725,302)	$ (31,589,041)	$ (26,161,232)
Non-controlling interest	$ (239,421)	$ (350,000)	$ 6,000	$ -	$ (583,421)	$ -
NET LOSS ATTRIBUTABLE TO BIOSIG TECHNOLOGIES, INC.	$ (8,321,318)	$ (7,704,000)	$ (7,255,000)	$ (7,725,302)	$ (31,005,620)	$ (26,161,232)
Net loss per common share, basic (in Dollars per share)	$ (0.26)	$ (0.24)	$ (0.21)	$ (0.22)	$ (0.93)	$ (0.64)
	$ (0.26)	$ (0.24)	$ (0.21)	$ (0.22)	$ (0.93)	$ (0.64)
Weighted average number of common shares outstanding, basic (in Shares)	31,584,142	32,169,191	34,856,502	35,618,496	33,557,083	40,846,671
Weighted average number of common shares outstanding, diluted (in Shares)	31,584,142	32,169,191	34,856,502	35,618,496	33,557,083	40,846,671

General Disclaimer:

Trickle Research LLC produces and publishes independent research, due diligence and analysis for the benefit of its subscriber base. Our publications are for information purposes only. Readers should review all available information on any company mentioned in our reports or updates, including, but not limited to, the company's annual report, quarterly report, press releases, as well as other regulatory filings. Trickle Research is not registered as a securities broker-dealer or an investment advisor either with the U.S. Securities and Exchange Commission or with any state securities regulatory authority. Readers should consult with their own independent tax, business and financial advisors with respect to any reported company. Trickle Research and/or its officers, investors and employees, and/or members of their families may have long/short positions in the securities mentioned in our research and analysis and may make purchases and/or sales for their own account of those securities. David Lavigne does not hold a position in BioSig.

Trickle Research co-sponsors two microcap conferences each year. Trickle Research encourages its coverage companies to present at those conferences and Trickle charges them a fee to do so. Companies are under no obligation to present at these conferences. BioSig has paid fees to present at Trickle's co-sponsored conference.

Portions of this publication excerpted from company filings or other sources are noted in *italics* and referenced throughout the report.

Rating System Overview:

There are no letters in the rating system (Buy, Sell Hold), only numbers. The numbers range from 1 to 10, with 1 representing 1 "investment unit" (for my performance purposes, 1 "investment unit" equals $250) and 10 representing 10 investment units or $2,500. Obviously, a rating of 10 would suggest that I favor the stock (at respective/current levels) more than a stock with a rating of 1. As a guideline, here is a suggestion on how to use the allocation system.

Our belief at Trickle is that the best way to participate in the micro-cap/small cap space is by employing a diversified strategy. In simple terms, that means you are generally best off owning a number of issues rather than just two or three. To that point, our goal is to have at least 20 companies under coverage at any point in time, so let's use that as a guideline. Hypothetically, if you think you would like to commit $25,000 to buying micro-cap stocks, that would assume an investment of $1000 per stock (using the diversification approach we just mentioned, and the 20-stock coverage list we suggested and leaving some room to add to positions around allocation upgrades. We generally start initial coverage stocks with an allocation of 4. Thus, at $1000 invested per stock and a typical starting allocation of 4, your "investment unit" would be the same $250 we used in the example above. Thus, if we initiate a stock at a 4, you might consider putting $1000 into the position ($250 * 4). If we later raise the allocation to 6, you might consider adding two additional units or $500 to the position. If we then reduce the allocation from 6 to 4 you might consider selling whatever number of shares you purchased with 2 of the original 4 investment units. Again, this is just a suggestion as to how you might be able to use the allocation system to manage your portfolio.

For those attached to more traditional rating systems (Buy, Sell, Hold) we would submit the following guidelines.

A Trickle rating of 1 thru 3 would best correspond to a "Speculative Buy" although we would caution that a rating in that range should not assume that the stock is necessarily riskier than a stock with a higher rating. It may carry a lower rating because the stock is trading closer to a price target we are unwilling to raise at that point. This by the way applies to all of our ratings.

A Trickle rating of 4 thru 6 might best (although not perfectly) correspond to a standard "Buy" rating.

A Trickle rating of 7 thru 10 would best correspond to a "Strong Buy" however, ratings at the higher end of that range would indicate something that we deem as quite extraordinary..... an "Extreme Buy" if you will. You will not see a lot of these.