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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ Annual Report under Section 13 or 15(d) of the Securities Exchange Act of 1934

For the fiscal year ended December 31, 2022

or

☐ Transition Report under Section 13 or 15(d) of the Securities Exchange Act of 1934

Commission File Number: 001-36338

22nd Century Group, Inc.

(Exact name of registrant as specified in its charter)

Nevada	**98-0468420**
(State or other jurisdiction of incorporation)	(IRS Employer Identification No.)

500 Seneca Street, Suite 507, Buffalo, New York 14204
(Address of principal executive offices)

(716) 270-1523
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol	Name of Exchange on Which Registered
Common Stock, $0.00001 par value	XXII	NASDAQ Capital Market

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer as defined in Rule 405 of the Securities Act
Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Exchange Act.
Yes☐ No ☒

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days.
Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Date File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files)
Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large Accelerated Filer ☐ Accelerated Filer ☐ Non-Accelerated Filer ☒ Smaller Reporting Company ☒

Emerging Growth Company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. Yes ☐ No ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

Indicate by check mark whether the registrant is a shell company (as defined by Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the registrant's common stock as of June 30, 2022, the last day of the registrant's most recently completed second fiscal quarter, was approximately $420 million based upon the closing price reported for such date on the Nasdaq Capital Market. On March 1, 2023, the registrant had 215,704,036 shares of common stock issued and outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

None.

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Cautionary Note Regarding Forward-Looking Statements and Risk Factor Summary

This Annual Report on Form 10-K contains forward-looking statements concerning our business, operations and financial performance and condition as well as our plans, objectives and expectations for our business operations and financial performance and condition that are subject to risks and uncertainties. All statements other than statements of historical fact included in this Annual Report on Form 10-K are forward-looking statements. You can identify these statements by words such as "aim," "anticipate," "assume," "believe," "could," "due," "estimate," "expect," "goal," "intend," "may," "objective," "plan," "potential," "positioned," "predict," "should," "target," "will," "would" and other similar expressions that are predictions of or indicate future events and future trends. These forward-looking statements are based on current expectations, estimates, forecasts and projections about our business and the industry in which we operate and our management's beliefs and assumptions. These statements are not guarantees of future performance or development and involve known and unknown risks, uncertainties and other factors that are in some cases beyond our control. All forward-looking statements are subject to risks and uncertainties that may cause actual results to differ materially from those that we expected, including the following summary of risks related to our business:

- We have had a history of losses and negative cash flows, and we may be unable to achieve and sustain profitability and positive cash flows from operations.
- Our competitors generally have, and any future competitors may have, greater financial resources and name recognition than we do, and they may therefore develop products or other technologies similar or superior to ours, or otherwise compete more successfully than we do.
- Our research and development process may not develop marketable products, which would result in loss of our investment into such process.
- We may be unsuccessful in our ability to integrate the operations of GVB Biopharma into ours and achieve the expected synergies with the acquired business.
- We may acquire or invest in other companies, which may divert our management's attention, result in additional dilution to our stockholders, and consume resources that are necessary to sustain our business or result in losses.
- The coronavirus pandemic (COVID-19) or another pandemic may cause a variety of business disruptions and future business risks.
- The failure of our information systems to function as intended or their penetration by outside parties with the intent to corrupt them could result in business disruption, litigation and regulatory action, and loss of revenue, assets, or personal or confidential data (cybersecurity).
- We may be unsuccessful at commercializing our Very Low Nicotine "VLN" tobacco as a Modified Exposure Cigarette.
- The manufacturing of tobacco products subjects us to significant governmental regulation and the failure to comply with such regulations could have a material adverse effect on our business and subject us to substantial fines or other regulatory actions.
- We may become subject to litigation related to cigarette smoking and/or exposure to environmental tobacco smoke, or ETS, which could severely impair our results of operations and liquidity.
- The loss of a significant customer for whom we manufacture tobacco products could have an adverse impact on our results of operation.
- Product liability claims, product recalls, or other claims could cause us to incur losses or damage our reputation.
- The FDA could force the removal of our products from the U.S. market.

- Negative press from being in the hemp/cannabis space could have a material adverse effect on our business, financial condition, and results of operations.
- Any business-related cannabinoid production is dependent on laws pertaining to the hemp/cannabis industry.
- Certain of our proprietary rights have expired or may expire or may not otherwise adequately protect our intellectual property, products and potential products, and if we cannot obtain adequate protection of our intellectual property, products and potential products, we may not be able to successfully market our products and potential products.
- We license certain patent rights from third-party owners. If such owners do not properly maintain or enforce the patents underlying such licenses, our competitive position and business prospects could be harmed.
- Our stock price may be highly volatile and could decline in value.
- We are a named defendant in certain litigation matters, including federal securities class action lawsuits and derivative complaints; if we are unable to resolve these matters favorably, then our business, operating results and financial condition may be adversely affected.
- Future sales of our common stock will result in dilution to our common stockholders.
- We do not expect to declare any dividends on our common stock in the foreseeable future.

For the discussion of these risks and uncertainties and others that could cause actual results to differ materially from those contained in our forward-looking statements, please refer to "Risk Factors" in this Annual Report on Form 10-K. The forward-looking statements included in this Annual Report on Form 10-K are made only as of the date hereof. We undertake no obligation to publicly update or revise any forward-looking statement as a result of new information, future events or otherwise, except as otherwise required by law.

Unless the context otherwise requires, references to the "Company" "we" "us" and "our" refer to 22nd Century Group, Inc., a Nevada corporation, and its direct and indirect subsidiaries.

PART I

Item 1. Business.

Overview

22nd Century Group, Inc. is a leading biotechnology company focused on utilizing advanced alkaloid plant technologies to improve health and wellness with reduced nicotine tobacco, hemp/cannabis and hops. We use modern plant breeding technologies, including genetic engineering, gene-editing, and molecular breeding to deliver solutions for the consumer goods and pharmaceutical industries by creating new, proprietary plants with optimized alkaloid and flavonoid profiles as well as improved yields and valuable agronomic traits. Our mission in tobacco products is dedicated to reduce the harms of smoking by commercializing our proprietary, very low nicotine content "VLNC" tobacco plants and cigarette products. We received the first and only Food and Drug Administration ("FDA") Modified Risk Tobacco Product ("MRTP") authorization of a combustible cigarette in December 2021. Beginning in April 2022, we launched our proprietary VLN® reduced nicotine cigarettes, first through a pilot program conducted in select Circle K stores in and around Chicago, Illinois. Following our successful pilot program, we initiated an ongoing state-by-state, region-by-region rollout strategy.

Our mission in hemp/cannabis is to develop and monetize proprietary varieties of hemp with valuable cannabinoid and terpene profiles and other superior agronomic traits. We are a global scale provider of cannabinoid ingredients and Active Pharmaceutical Ingredients ("API"), as well as a contract development and manufacturing organization (CDMO) provider of hemp-derived consumer products.

In hops, our mission is to leverage our experience with tobacco and hemp/cannabis, a close hop plant relative, to accelerate the development of proprietary specialty hop varieties with valuable traits, for potential applications in life sciences and consumer products.

We have a significant intellectual property portfolio of issued patents and patent applications relating to both tobacco and hemp/cannabis plants and have further resources directed towards creating and securing additional intellectual property pertaining to all three franchises. We continue to prioritize research and development activities to achieve our strategic and investment priorities.

Our Recent Acquisitions

In May 2022, we completed the acquisition of GVB Biopharma ("GVB"), a privately held contract development and manufacturing organization (CDMO). GVB is believed to be one of the largest providers of hemp-derived active ingredients for the pharmaceutical and consumer goods industries worldwide based on total tonnage. GVB has industry-leading market positions and expertise in many facets of the hemp/cannabis industry, which include: research and genetics, proprietary cryogenic hemp extraction; refining, conversion, and product formulation technology; leading supplier of API's; low-cost, scalable manufacturing capabilities; regulatory and compliance expertise; industry trusted high-quality products; and current international capabilities

We believe that GVB's strengths complement our existing upstream and downstream value chains, which includes expertise in cannabinoid receptor science with CannaMetrix, plant research, molecular breeding, and proprietary genetics through our KeyGene partnership, and breeding expertise with Extractas Bioscience (formerly Tasmanian Alkaloids PTY). The combination with us results in a vertically integrated, novel cannabinoid value chain by controlling the product cycle from plant genetics to finished ingredients and CDMO formulated products that meet exacting standards required by global consumer and products and pharmaceutical companies.

The acquisition of GVB has expanded our global footprint adding U.S. and international assets and capabilities. GVB operates three primary manufacturing facilities that have significant capacity to support growth. These three facilities are located in Grass Valley, Oregon (refinement facility), Las Vegas, Nevada (Private Label/Contract Manufacturing), and Prineville, Oregon (crude extraction). GVB's new Prineville, Oregon facility is one of the largest hemp extraction plants in the world, with expected CBD crude output capacity exceeding 15,000 kg/month at full capacity. The new facility is expected to be fully operational in the first half of 2023, allowing GVB greater vertical integration and improved gross margins as it ramps volume. We are actively pursuing additional business development through both our and GVB's existing relationships to further accelerate its growth.

In January 2023, we completed the acquisition of RX Pharmatech Ltd ("RXP"), a privately held leading United Kingdom distributor of cannabinoids with 1,276 novel food applications with the U.K. Food Standards Agency ("FSA"). RXP's products include CBD isolate and numerous variations of finished products like gummies, oils, drops, candies, tinctures, sprays, capsules and others. The U.K. is not accepting new novel food applications for cannabinoid products at this time and denied tens of thousands of product applications earlier in 2022 during the FSA's first round of screening. Accordingly, we believe this market dynamic could allow us to open new opportunities to land highly accretive contracts with multinationals for quality CBD and hemp-derived consumer products dependent on the novel food licenses.

Tobacco Segment Overview

We are dedicated to reducing the harms of smoking by commercializing our proprietary VLNC tobacco plants and cigarette products, which contain 95% less nicotine than conventional tobacco and cigarettes. The FDA publicly announced on July 28, 2017, that tobacco use remains the leading cause of preventable disease and death in the United States. The website for the U.S. Centers for Disease Control and Prevention ("CDC") states that tobacco use causes more than 480,000 deaths per year and costs the United States economy nearly $300 billion annually in lost productivity and direct health care costs. The CDC website also states that in 2015, nearly 7 in 10 (68.0%) adult cigarette smokers wanted to stop smoking, and more than 5 in 10 (55.4%) adult cigarette smokers had made a quit attempt in the prior year. That said, CDC statistics state that while more than two-thirds of adult smokers want to quit successfully, less than ten percent of them are able to quit successfully.

Utilizing GMO and non-GMO methods, we have successfully modified and developed unique proprietary bright, burley, and oriental VLNC tobaccos that grow with at least 95% less nicotine than tobacco used in conventional cigarettes. In 2011, we developed our SPECTRUM® research cigarettes in collaboration with independent researchers, officials from the FDA, the National Institute on Drug Abuse ("NIDA"), which is part of the National Institutes of Health ("NIH"), the National Cancer Institute ("NCI"), and the CDC. Since 2011, we31.6 have provided more than 32.8 million variable nicotine research cigarettes for use in numerous independent clinical studies with agencies of the United States federal government. These independent clinical studies are estimated to have been performed at a cost of more than $125 million. The results of these independent clinical studies have been published in peer-reviewed publications (including the *New England Journal of Medicine*, the *Journal of the American Medical Association*, and many others). These studies indicate that use of our VLNC tobaccos have been associated with reductions in smoking (measured in cigarettes per day), nicotine exposure and nicotine dependence with little to no evidence of compensatory smoking and without serious adverse events. A list of ongoing as well as completed and published clinical studies using cigarettes made with our VLNC tobaccos is shown on our website at https://www.xxiicentury.com/vln-clinical-studies/published-clinical-studies-on-very-low-nicotine-content-vlnc-cigarettes. We do not incorporate third party studies or the information on our website into this Annual Report on Form 10-K.

Our reduced nicotine content cigarettes have been used in more than 50 independent scientific clinical studies by universities and institutions. These studies show that smokers who use our products: (i) reduce their nicotine exposure and dependence, (ii) smoke fewer cigarettes per day, (iii) increase their number of smoke-free days, and (iv) double their quit attempts – all with minimal or no evidence of nicotine withdrawal or compensatory smoking. Our research cigarettes, SPECTRUM®, continue to be used in numerous independent, scientific studies to validate the enormous public health benefit identified by the FDA and others of implementing a national product standard requiring all cigarettes to contain "minimally or nonaddictive" levels of nicotine. Our SPECTRUM® variable nicotine research cigarettes are the precursor to our VLN® cigarette products.

We believe that our proprietary reduced nicotine content cigarettes, sold under the brand name VLN®, have a large global market opportunity. According to a 2021 report by the Foundation for a Smoke Free World, global nicotine retail sales totaled approximately $853 billion and of that, 84.1% was comprised of combustible cigarettes. According to the CDC and the World Health Organization ("WHO"), there are more than 1 billion global and 30 million U.S. adult smokers. CDC statistics state that while more than two-thirds of adult smokers want to quit, less than ten percent of them are able to quit successfully. Despite the proliferation of vape and other nicotine delivery systems, we believe that smokers are still seeking alternatives to addictive combustible cigarettes. In our consumer perception studies, 60% of adult smokers indicated a likelihood to use VLN®.

Our VLN® cigarettes contain 95% less nicotine content than conventional cigarettes in a familiar combustible product format that replicates the conventional cigarette smoking experience, including the sensory and experiential elements of taste, scent, smell, and "hand-to-mouth" behavior. The tobacco in VLN® cigarettes contain a target of just 0.5 milligrams of nicotine per gram of tobacco, an amount cited by the FDA, based on clinical studies, to be "minimally or non-addictive." It is believed that the reduced nicotine content of VLN® creates a dissociation between the act of smoking and the rapid introduction of nicotine to the bloodstream, which helps adult smokers to smoke less.

The results of these numerous completed studies provide the independent scientific foundation for the public announcement on July 28, 2017 by the FDA that the FDA plans to enact a new rule to require that all combustible cigarettes sold in the United States contain only minimally or non-addictive levels of nicotine. This was stated on March 19, 2018, where the FDA publicly announced its Advance Notice of Proposed Rulemaking ("ANPRM") to solicit public comments on the FDA's plan to enact a new nicotine reduction rule. On July 16, 2018, we publicly submitted to the FDA our formal written response to the ANPRM in which we described how (i) the FDA's proposed new rule is supported by rigorous independent, published science, (ii) the FDA's stated goal to render all cigarettes minimally or non-addictive is immediately feasible as evidenced by our production and delivery of millions of VLNC research cigarettes since the year 2011, and (iii) the FDA's proposed new rule is exceedingly practical and urgently needed in the interests of public health. On December 23, 2021 we were granted authorization to market our VLN® cigarettes under a Modified Risk Tobacco Product, modified exposure designation. We subsequently began efforts to offer our proprietary VLNC cigarettes for domestic sale under the brand name of VLN® within 90 days of the receipt of the Modified Risk Tobacco Product ("MRTP") marketing order. We also plan to offer VLN® for international sale and for licensing by third parties. Additional information regarding our regulatory activities with the FDA is described below.

Proposed Government Mandates Limiting the Nicotine in Cigarettes.

In a June 16, 2010 press release, Dr. David Kessler, a former FDA Commissioner, recommended that "the FDA should quickly move to reduce nicotine levels in cigarettes to non-addictive levels. If we reduce the level of the stimulus, we reduce the craving. It is the ultimate harm reduction strategy." Shortly thereafter in a *Washington Post* newspaper article, Dr. Kessler said that the amount of nicotine in a cigarette should drop from about 10 milligrams to less than 1 milligram. 22nd Century's reduced nicotine cigarettes contain between 0.3-0.7 mg/g nicotine.

In 2015, the World Health Organization ("WHO") Study Group on Tobacco Product Regulation published an advisory note on a global nicotine reduction strategy of limiting the sale of cigarettes to brands with a nicotine content that is not sufficient to lead to the development and/or maintenance of addiction. The WHO study stated that no specific amount of nicotine has yet been identified by the WHO as the absolute threshold for addiction; however, the WHO report stated that it is likely to be equal to or possibly less than 0.4 mg/g of dry cigarette tobacco filler. The WHO report cites 22nd Century's proprietary SPECTRUM® research cigarettes as meeting such a low level of nicotine of 0.4 mg/g of cigarette tobacco filler. The WHO report concluded that the evidence indicates that setting a maximum allowable nicotine content for all cigarettes could (i) reduce the acquisition of smoking and progression to addiction, (ii) reduce the prevalence of smoking in a proportion of addicted smokers as a result of behavioral extinction, and (iii) increase the rate of quitting and reduce the number of smokers who relapse. The WHO report stated that population benefits will result from decreased use of combusted tobacco by current cigarette smokers and from the prevention of addiction of non-smokers to cigarettes, especially among young people.

On July 28, 2017, then FDA Commissioner Scott Gottlieb, M.D., announced the FDA's plan to exercise its authority under the Tobacco Control Act to require that all combustible cigarettes sold in the United States contain only minimally or non-addictive levels of nicotine.

On August 16, 2017, *The New England Journal of Medicine* published an article by FDA Commissioner Scott Gottlieb, M.D. and Mitchell Zeller, J.D., the Director of the FDA's Center for Tobacco Products ("FDA/CTP"), entitled "A Nicotine-Focused Framework of Public Health." In this article, FDA Commissioner Gottlieb and FDA/CTP Director Zeller stated that the Tobacco Control Act gives the FDA a regulatory tool called a tobacco "product standard" that can be used to alter the addictiveness of combustible cigarettes. Although the statute prohibits the FDA from requiring the reduction of nicotine yields of a tobacco product to zero, the FDA stated in this article that the FDA has clear authority to otherwise reduce nicotine levels. The FDA concluded in this article that a nicotine-limiting standard could make cigarettes minimally addictive or non-addictive, helping current users of combustible cigarettes to quit and allowing most future users to avoid becoming addicted and proceeding to regular use. The FDA stated that, as in all matters of public health policy, the FDA will be led by science in this important area.

In April 2021, the New Zealand government announced a six-week consultation (15 April – 5pm, May 31, 2021) on Proposals for a Smokefree Aotearoa 2025 Action Plan. This consultation included proposals to reduce nicotine in smoked tobacco products to very low levels. The Company returned a detailed, comprehensive submission to the New Zealand Ministry of Health in full support of the Smokefree proposals [Response Identifier 1048733132, publicly available]. The final Smokefree Aotearoa 2025 Action Plan was launched on December 9, 2021[https://www.health.govt.nz/our-work/preventative-health-wellness/tobacco-control/smokefree-aotearoa-2025-action-plan].

In December 2022, the New Zealand government parliamentary body passed the Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Bill requiring all combustible tobacco cigarettes sold in New Zealand to contain no more than 0.8 mg of nicotine per gram of tobacco. After becoming law by Royal Asset later that month, the requirement will take effect within 27 months.

We believe that recent political changes will likely be favorable to our business prospects from a policy priority and regulatory standpoint. Under the new leadership at the FDA and Center for Tobacco Products ("CTP"), we believe that the FDA will refocus on implementing its ground-breaking Comprehensive Plan for Tobacco and Nicotine Regulation, in particular the Agency's plan to cap the amount of nicotine in combustible cigarettes to a "minimally or non-addictive" level. We believe that the MRTP authorization and the launch of VLN® serves as a powerful catalyst for the FDA's proposed policies.

On January 27, 2022, the FDA posted an update on its FDA Voices site stating that it "remains on track" with its plans to prohibit menthol in combustible tobacco products. We continue to support upcoming FDA action and believe VLN® Menthol King reduced nicotine cigarettes could be exempted from the menthol ban to help current menthol smokers transition away from highly addictive nicotine cigarettes. The FDA published a proposed tobacco product standard to ban menthol as a characterizing flavor in cigarettes in April 2022. The proposed FDA rule includes a process for firms to request an exemption from the standard for specific products of certain types on a case-by-case basis, indicating "reduced nicotine" as an example of such an exemption. On August 1, 2022, we submitted public comments in support of a tobacco product standard for menthol in cigarettes.

Subsequently, in January 2023 the FDA's proposed ban on menthol as a flavoring in combustible cigarettes advance to final rule status, with expectations of a final decision in August 2023.

In June 2022, the FDA announced that the Biden-Harris Administration published plans for future regulatory action that includes the FDA's plans to develop a proposed product standard that would establish a maximum nicotine level to reduce the addictiveness of cigarettes and certain other combusted tobacco products. On June 21, 2022, a proposed rule for a tobacco product standard for nicotine level of certain tobacco products was published in the Spring 2022 Unified Agenda of Regulatory and Deregulatory Actions.

In late October 2022, in coordination with the FDA, the National Institute on Drug Abuse (NIDA), and others, we received an order for 2.8 million variable nicotine cigarettes. Our research cigarettes will continue to fuel numerous independent, scientific studies to validate the enormous public health benefits identified by the FDA and others of implementing a national standard requiring all cigarettes to contain minimally or non-addictive levels of nicotine.

We continue to advance on our reduced nicotine technology as we believe that our next generation, non-GMO plant research is the key to commercializing our reduced nicotine content tobacco and technology in international markets where non-GMO products are preferred or where GMO products are banned. Our patented, non-GMO technology can introduce very low nicotine traits into virtually any variety of tobacco, including bright, burley, and oriental. We have successfully applied our non-GMO technology to bright and burley varieties of tobacco and have initiated commercial growing activities for our non-GMO bright and burley reduced nicotine varieties. We anticipate commercial production of our American blend cigarettes featuring a mix of bright and burly VLN® tobacco varieties to begin in 2023.We believe that our VLNC tobacco technology and our production and delivery of millions of proprietary variable nicotine research cigarettes since 2011 reflects that the FDA's plan to dramatically reduce nicotine in cigarettes is technically achievable.

In the United States, we are focused on working with the FDA on its nicotine reduction mandate. Outside the United States, we will focus on working with WHO-member countries that desire to utilize our proprietary VLNC tobacco to implement the WHO recommendation of limiting the sale of cigarettes to brands with a nicotine content that is not sufficient to lead to development and/or maintenance of addiction.

Modified Risk Tobacco Products

The Family Smoking Prevention and Tobacco Control Act of 2009 ("Tobacco Control Act") granted the FDA authority over the regulation of all tobacco products in the United States. The Tobacco Control Act further establishes procedures for the FDA to regulate the labeling and marketing of Modified Risk Tobacco Products, which includes cigarettes marketed to (i) reduce harm or the risk of tobacco-related disease or (ii) reduce or eliminate exposure to a substance ("Modified Exposure Cigarettes").

On December 5, 2018, we submitted to the FDA a new Premarket Tobacco Application ("PMTA") and on December 27, 2018 we submitted to the FDA a new MRTP application, for our reduced nicotine tobacco cigarettes. Through our applications, we requested a reduced exposure marketing authorization from the FDA to market these products as Modified Exposure Cigarettes with product labeling that includes the brand name of VLN® and states that VLN® has 95% less nicotine than conventional cigarettes.

On December 17, 2019, the FDA authorized our PMTA. While the PMTA authorized us to market the products in the U.S. it did not allow us to make product claims which would indicate that the product contains 95% less nicotine. Marketing product claims requires the FDA to authorize an MRTP application.

On December 23, 2021, we secured the world's first and only MRTP designation for a combustible cigarette for VLN® King and VLN® Menthol King 95% reduced nicotine content cigarettes. The FDA authorized the marketing of VLN® with the following claims, "*95% less nicotine*", "*Helps reduce your nicotine consumption*", and "*Greatly reduces your nicotine consumption*,". The FDA also proactively added "*Helps You Smoke Less,*" an evidence-based headline claim to our requested claims.

In previous years, we contracted with farmers to grow considerable quantities of VLNC tobacco in anticipation of FDA authorization of our MRTP and subsequent commercial launch of VLN® cigarettes. In January 2022, at our manufacturing facility in North Carolina, we produced the first cartons of our VLN® reduced nicotine cigarettes, destined for commercial sale. In April 2022, we launched VLN® cigarettes in the U.S. market. We believe that the commercialization of VLN® cigarettes will create further opportunities for us to license our proprietary technology tobaccos and the VLN® brand.

VLN® Commercialization Plan

In April 2022, we initiated VLN® sales in more than 150 Circle K stores in the Chicago metro area through a pilot launch. After the pilot concluded and, given the positive results, we made the decision to further deepen our reach in the state of Illinois and launch VLN® in Colorado to more than 3,000 potential locations across the state with our network of retailers and distribution partners, including Eagle Rock Distributing Company and Creager Mercantile.

The pilot enabled us to refine our VLN® rollout strategy and helped us develop our VLN® Sales Launch Blueprint, an efficient, reproducible sales plan that focuses our resources to achieve the greatest returns. In November 2022, we announced that we intend to expand our VLN® launch to Arizona, New Mexico, and Utah, and announced plans to expand into up to 18 U.S. states over the following 12 months. In January 2023 we announced distribution partnerships with Core-Mark International and Eby-Brown Company, two of the largest convenience store distributors in the U.S., providing access to retailers in virtually every key U.S. market.

By concentrating and going deeper into select geographies and markets with high cigarette volume and large adult smoker populations, we believe we can capture greater market share effectively. We also plan to target states where there is a tax exemption for MRTP products. As of March 1, 2023, we have secured regulatory authorizations to sell VLN® in 48 states and the District of Columbia.

To meet anticipated demand for our VLN® products in the U.S. and elsewhere, we contracted with third parties to plant our largest ever VLN® tobacco crop in 2022, which includes our second-generation reduced nicotine tobacco plants. We are seeing 30% higher yields, enhanced quality leaf, improved disease resistance, a reduction in nutrient inputs, and increased stability across various environments and geographies. We have also expanded our existing manufacturing operations to increase capacity by 25%, including installation of a new production line and initiation of a second shift.

Tobacco Master Settlement Agreement

In September 2013, we entered into a Membership Interest Purchase Agreement (the "NASCO Acquisition") to purchase all of the issued and outstanding membership interests of NASCO, a federally licensed tobacco product manufacturer and subsequent participating manufacturer under the Master Settlement Agreement ("MSA"). The MSA is an accord reached in November 1998 between the State Attorneys General of 46 states, five U.S. territories, the District of Columbia and the five largest tobacco companies in the United States concerning the advertising, marketing and promotion of tobacco products. The MSA also set standards for, and imposes restrictions on, the sale and marketing of cigarettes by participating cigarette manufacturers. On August 29, 2014, we entered into an Amended Adherence Agreement with the 46 Settling States under the MSA pursuant to which the Company was approved to acquire NASCO and become a subsequent participating manufacturer under the MSA. On that same date, we closed the NASCO Acquisition and became a subsequent participating manufacturer under the MSA. NASCO has since been our wholly-owned subsidiary.

Tobacco Manufacturing

We lease a cigarette manufacturing facility and warehouse located in Mocksville, North Carolina. In 2013, we purchased certain (i) cigarette manufacturing equipment, and (ii) equipment parts, factory items, office furniture and fixtures, vehicles and computers from the bankruptcy estate of PTM Technologies, Inc. for approximately $3.2 million.

The facility was primarily in a pre-manufacturing stage during 2014 as we sought approval during that time for us to become a subsequent participating manufacturer under the MSA. On August 29, 2014, we became a subsequent participating manufacturer under the MSA. Since 2015, we have manufactured and sold our SPECTRUM® variable nicotine research cigarettes, as well as third-party filtered cigar brands and MSA-compliant cigarette brands, at our factory in North Carolina.

The strategic acquisition of our factory has allowed us to become vertically integrated so that we can control production priorities/timing and maintain the required high quality of our products, including our SPECTRUM® research cigarettes and our MRTP-designation VLN® brand cigarettes featuring 95% less nicotine than the top 100 leading brands sold in the United States. In January 2022, our cigarette manufacturing facility began production of VLN® King and VLN® Menthol King cigarettes.

Tobacco Sources of Raw Materials

We obtain our reduced nicotine tobacco leaf from third party-growers, primarily in multiple states in the United States who are under direct contracts with us. These contracts prohibit the transfer of our proprietary tobaccos, seeds and plant materials to any other party. We purchase conventional tobacco destined for contract manufacturing operations through third parties. In anticipation of the FDA's authorization of our MRTP application for our VLN® cigarettes, we increased the amount of tobacco leaf we obtain directly from growers under contract during 2021 and 2022. In 2023, we will again grow substantial quantities of VLNC tobacco to supply the expansion of VLN® cigarette sales.

Hemp/Cannabis Segment Overview

Following the May 2022 acquisition of GVB, our hemp/cannabis business is a global scale provider of hemp-derived cannabinoid ingredients and API, as well as a CDMO to the consumer goods industry. We are also a solutions provider to companies that utilize cannabinoids in their consumer products, companies looking to optimize their plant genetics and companies seeking large-scale production of high-quality finished products. Our vertically integrated, novel cannabinoid value chain covers elements from receptor science and plant genetics to finished ingredients and CDMO formulated products that meet the exacting standards required by global consumer product and pharmaceutical companies.

Our innovative product development cycle can potentially produce new, disruptive, and highly differentiated product solutions, including plant lines or ingredients (flower, extracts, distillates, isolates, etc.) derived from hemp/cannabis plants. Most existing hemp/cannabis plant lines do not exhibit the stable genetics, predictable yield, and specific composition of cannabinoids required to fully unlock the value of the hemp/cannabis industry. We believe our plant genetics and innovative upstream cannabinoid value chain provide for rapid development and optimization of plant products and scale-up as the industry evolves toward mass production.

We believe we are set to be one of the largest providers of hemp-derived active ingredients for the pharmaceutical and consumer goods industries worldwide based on total tonnage. We have industry leading market positions and expertise in all facets of the hemp/cannabis industry, which include: research and genetics, proprietary cryogenic hemp extraction; refining, conversion, and product formulation technology; leading supplier of Active Pharmaceutical Ingredients (API); low-cost, scalable manufacturing capabilities; regulatory and compliance expertise; industry trusted high-quality products; current international capabilities

We believe that GVB's strengths complement our existing upstream and downstream value chains, which includes expertise in cannabinoid receptor science with CannaMetrix, plant research, molecular breeding, and proprietary genetics through our KeyGene partnership, and breeding expertise with Extractas Bioscience (formerly Tasmanian Alkaloids PTY). The combination of the Companies has resulted in a vertically integrated novel cannabinoid value chain by (1) controlling the product cycle from plant genetics to finished ingredients, (2) allows for CDMO formulated products that meet exacting standards required by global consumer products and pharmaceutical companies, and (3) has expanded our global footprint adding U.S. and international assets and capabilities.

At the time of the acquisition, GVB operated three primary manufacturing facilities with significant capacity to support growth with limited capital expenditure. These three facilities are located in Grass Valley, Oregon (refinement facility), Las Vegas, Nevada (Private Label/Contract Manufacturing), and Prineville, Oregon (crude extraction). Our new Prineville, Oregon facility is one of the largest hemp extraction plants in the world, with expected CBD crude output capacity exceeding 15,000 kg/month at full capacity. The new facility is expected to be fully operational in the first half of 2023, allowing us greater vertical integration and improved gross margins as it ramps volume. We are actively pursuing additional business development through both our and GVB's existing relationships to further accelerate its growth.

During the third quarter 2022, we passed the NSF International Audit with a grade A, and no deficiencies were found and, as a result, we obtained a renewal of our cGMP registration for Dietary Supplements Registration for our manufacturing facilities. NSF is one of the largest third-party compliance and standards organizations globally. It provides testing, auditing, and certification services, assuring suppliers that an independent organization has reviewed a product or system to comply with specific standards for safety, quality, sustainability or performance. Our cGMP registration encompasses dietary supplements, dietary ingredients, and functional food facility certification. With this audit and certification secured, we plan to pursue pharma-grade manufacturing.

In November 2022, a fire occurred at our Grass Valley manufacturing facility in Oregon, where we manufactured bulk ingredients, primarily CBD isolate and distillate. The site was safely evacuated and there were no serious reported injuries; however, there was extensive damage to the manufacturing site. We promptly shifted sourcing to alternate suppliers in order to continue fulfilling customer orders. Operations for bulk ingredient customers will have minor disruptions continuing in the first half of 2023. We are presently establishing interim distillate and isolate production capabilities, which we believe will replace the approximate capacity lost at our Grass Valley facilities. Longer term, we are evaluating options to build a comprehensive production and manufacturing campus with appropriate scale and expansion capabilities to meet both present and future demand requirements for our manufactured bulk ingredients.

In January 2023, we submitted a Drug Master File (DMF) to the FDA to produce and supply cannabinoid-based APIs for the medical and pharmaceutical industries requiring the highest quality cannabinoids in the U.S. We also expect to pursue The International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH) Q7 international pharma-grade audit standard certification so we can supply naturally derived hemp/cannabis APIs to companies globally.

In November 2022, we opened a central distribution facility in the Netherlands to support the growing demand for hemp/cannabis products in Europe, the Middle East, and Africa (EMEA). The facility is intended to speed up transaction flow and optimize cross border tax and customs treatment.

In January 2023, we completed the acquisition of RXP, a privately held distributor of cannabinoids with 1,276 novel food applications with the U.K.'s FSA. RXP has exclusively utilized GVB's technical data and worked closely with the FSA on developing their highly effective application and compliance programs that secured 1,276 novel food applications. RXP's products include CBD isolate and numerous variations of finished products like gummies, oils, drops, candies, tinctures, sprays, capsules and others.

Hemp/Cannabis Regulatory Background

On December 20, 2018, the Agricultural Improvement Act of 2018, which is also known as the "2018 Farm Bill," was enacted and, among other things, further legalized hemp under U.S. federal law, but with compliance still being required with all applicable state hemp laws. The 2018 Farm Bill includes certain benefits for the hemp industry in the United States, including: (i) the extension of the protections for hemp research and researchers and the conditions in which hemp research can be done, (ii) the protection of hemp farmers and hemp production under federal crop insurance programs, (iii) the permitting of the cultivation, interstate transportation and sale of hemp and hemp products in the U.S. in compliance with all other applicable federal and state laws, and (iv) the removal of hemp and hemp derived products from Schedule 1 of the Controlled Substances Act ("CSA").

As of March 1, 2023, (i) federal law and the laws of 50 states in the United States and the District of Columbia have legalized hemp to at least some degree, (ii) 37 states in the United States, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands have enacted laws and/or regulations that recognize, in one form or another, legitimate medical uses for cannabis/marijuana and consumer use of cannabis/marijuana in connection with medical treatment, and (iii) 31 states in the United States, the District of Columbia, Guam, and the Northern Mariana Islands have decriminalized cannabis/marijuana for adult recreational use. Many other states are considering similar legislation. Conversely, under the federal CSA, the policies and regulations of the federal government and its agencies are that cannabis/marijuana has no medical benefit and a range of activities are prohibited, including cultivation, possession, personal use and interstate distribution of cannabis/marijuana.

In hemp, we are developing proprietary hemp varieties with increased levels of certain cannabinoids and other desirable agronomic traits with the goal of generating new and valuable intellectual property and plant lines. Our activities in the United States involve only working with legal hemp in full compliance with U.S. federal and state laws. Hemp and marijuana are from the same *cannabis* genus. One major difference is that hemp does not have more than 0.3% dry weight content of delta-9-tetrahydrocannabinol ("THC"). While the 2018 Farm Bill legalized hemp and cannabinoids extracted from hemp in the U.S., such extracts remain subject to state laws and regulation by other U.S. federal agencies such as the FDA, U.S. Drug Enforcement Administration ("DEA"), and the U.S. Department of Agriculture ("USDA"). The same plant, with a higher THC content is marijuana, which is legal under certain state laws, but is currently not legal under U.S. federal law. The similarities between these plants can cause confusion. To reflect this difference in law, sometimes we refer to legal hemp and the legal hemp industry as hemp/cannabis to distinguish this as being separate and apart from marijuana/cannabis which is not legal under U.S. federal law. Our activities with legal hemp have sometimes been incorrectly perceived as us being involved in federally illegal marijuana/cannabis. This is not the case. In the United States, we work only with legal hemp in full compliance with federal and state laws, and outside the U.S., we operate in full compliance with the laws of each country in which we operate.

In 2022, we expanded our research facilities in Rockville, Maryland with new state of art laboratory with more than 4,500 square feet and obtained a license in the State of Maryland to do research on and grow hemp.

Hemp/Cannabis Partnerships

In Europe and the United States, we are currently working with KeyGene NV ("KeyGene"), a global leader in plant research involving high-value genetic traits and increased crop yields. In our exclusive collaboration with KeyGene, we are focused on traditional and molecular breeding along with genetic engineering using gene editing and mutagenesis to develop hemp/cannabis plants with exceptional cannabinoid profiles and other superior agronomic traits for medical, therapeutic and agricultural uses, among many other applications. In 2021, we further enhanced our partnership with KeyGene to extend our relationship for an additional three years and to solidify a governance structure whereby we agree on specific research activities to develop intellectual property jointly with KeyGene in the future.

In 2021, we entered into several research contracts with plant breeders and organizations committed to researching the potential effects which cannabis products have on human cell biology. We have evolved our strategy to align with companies which provide for excellent synergies to our research efforts. We continue to review potential candidate companies in the hemp/cannabis field for strategic collaborations, affiliations, joint ventures, investments, and/or acquisitions.

Hops Business Overview

On August 30, 2021, we announced our intention to commence research and development in hops, a plant that possesses similar biological characteristics to hemp/cannabis. We are leveraging our experience with tobacco and hemp/cannabis to accelerate the development of proprietary specialty hop varieties with valuable competitive advantages to increase yields and distinctive aroma, flavor, nutraceutical and medicinal properties, and disease/pest resistance. We believe that our innovative upstream alkaloid plant value chain is critical to unlocking new disruptive hop plant varieties and IP at large-scale. We are leveraging research findings from the closely related hemp/cannabis plant and our strategic partnerships to support the development of our new technologies based on molecular breeding, flowering time, and double haploid breeding to accelerate the stabilization or creation of hop varieties. Industry reliance on high-risk traditional breeding techniques makes hops ripe for disruption with our new accelerated molecular breeding technologies and gene editing tools.

Hops is a large global addressable market with well-established hops providers and consumer brands. We are actively engaged in discussions with multiple hops growers and consumer product partners to develop specific desired traits in leading hop strains that are already well-accepted by the brewing industry. In early 2022, we expanded our exclusive research agreement with KeyGene to identify specific traits which, if appropriately engineered, could benefit consumers of hop products in both the beer and nutraceuticals segment on the industry. We believe hops presents a faster route to commercialization than tobacco and hemp/cannabis due to lower regulatory barriers.

Research & Development (R&D) & Intellectual Property (IP)

Tobacco R&D

Since our inception, the majority of our research and development ("R&D") efforts have been outsourced to highly qualified groups in their respective fields. Since 1998, we have had multiple R&D agreements with North Carolina State University ("NCSU") and others resulting in exclusive worldwide licenses to various patented technologies. We have utilized the same model employed by many public-sector research organizations, which entails obtaining an exclusive option or license agreement to any invention arising out of our funded research. In all such cases, we fund and control all patent filings as the exclusive licensee. This model of contracting with public-sector researchers has enabled us to control R&D costs while achieving our desired results, including obtaining exclusive intellectual property rights relating to our outsourced R&D.

On June 22, 2018, we entered into an amendment to our existing license agreement with NCSU under which we exclusively licensed several bright and burley tobacco plant lines with Very Low Nicotine Content that are not genetically modified (non-GMO) plants. The amendment provided for us to pay NCSU a total exclusive license fee of $1.2 million—refer to Note 8 to our consolidated financial statements for additional information. We will also pay running royalties to NCSU based on a portion of the net sales revenue received by us from sales of products that contain any portions of the plant materials that have been received by us from NCSU.

On October 22, 2018, we entered into a license agreement with the University of Kentucky ("UK") to license on a non-exclusive basis a next-generation very low nicotine content burley tobacco plant lines that are not genetically modified (non-GMO) plants. The UK license agreement provided for us to pay UK a total license fee of $1.2 million—refer to Note 8 to our consolidated financial statements for additional information. We will also pay running royalties to UK based on a portion of the net sales revenue received from sales of products that contain any portions of the plant materials that have been received from UK.

On December 1, 2021, we relocated our own laboratory from Buffalo, New York to Rockville, Maryland, where we are conducting our own proprietary research and development activities in tobacco. The new laboratory space has over four thousand square feet, is near our strategic research partner, KeyGene, and will help support our continued growth and R&D partnerships.

In 2022, our R&D collaboration with NCSU delivered the proof of concept and field data for a new gene combination (non-GMO) to reduce nicotine below 95%. This unique gene combination enables the production of a better-quality leaf and an increase in yield. In January 2022, a utility patent to protect the new combination was filed. Our exclusive NCSU collaboration also yielded proof of concept and field data for Oriental lines with a 90-95% nicotine reduction. These results will give us the option in the future to produce VLN cigarettes that comprise burley, oriental, and bright tobacco thus improving overall quality. In addition, this year we extended our VLN production field trial to include new burley and flue-cured VLN (non-GMO).

We are currently developing new versions of our VLNC cigarettes utilizing these non-GMO tobacco lines for future commercialization in the U.S. and globally.

Tobacco IP

Our intellectual property enables us to alter the level of nicotine and other nicotinic alkaloids in tobacco plants through genetic engineering and modern plant breeding. The basic techniques include, but are not limited to, those that are used in the production of genetically modified and gene-edited varieties of other crops, which are also known as "biotech crops."

We have extensive patent protection and exclusive rights covering tobacco plants with altered nicotine content produced from modifying expression of certain genes in the tobacco plant. Our patent families related to nicotine biosynthesis are expected to expire between 2026 and 2041, with certain extensions of terms in the U.S. applications resulting from patent term adjustments at the U.S. Patent and Trademark Office. (A "patent family" is a set of patent applications and patents, filed in various countries, that relate back to at least one common earlier application.). Our Vector 21-41 VLNC tobacco plants with the QPT modification are also protected by plant variety protection ("PVP"), which further restricts third-parties from using such plants.

We also have exclusive plant variety protection rights in the United States and many other countries. PVP certificates are issued in the United States by the U.S. Department of Agriculture. A PVP certificate prevents anyone other than the owner/licensee from planting, propagating, selling, importing or exporting a plant variety for twenty (20) years in the U.S. and, generally, for twenty (20) years in other member countries of the International Union for the Protection of New Varieties of Plants, known as UPOV, an international treaty concerning plant breeders' rights. There are currently more than 70 countries that are members of UPOV. Our current VLNC tobaccos are protected by our patent portfolio and our Vector 21-41 VLNC tobacco is additionally protected by PVP.

In addition to our patents, patent applications, and PVP certificates, we own various registered trademarks in the United States and around the world.

Hemp/Cannabis R&D and IP

Our intellectual property and know-how enables us to alter the levels of cannabinoids in cannabis plants through genetic engineering and modern plant breeding. The basic techniques include, but are not limited to, those that are used in the production of genetically modified and gene-edited (new breeding techniques) varieties of other crops. We have developed various types of cannabis plants with agronomically desirable traits for commercial uses and/or unique cannabinoid/terpenoid levels. We believe that we have many types of superior and unique cannabis plant varieties in development, including (i) plants with low to no amounts of THC and other desirable agronomic traits for the legal hemp industry and (ii) plants with high levels of cannabinoids (including CBD and many minor cannabinoids) for use in legal cannabinoid markets.

In September 2014, we entered into a Sublicense Agreement with Anandia (the "Anandia Sublicense"). Under the terms of the Anandia Sublicense, we were granted an exclusive sublicense in the United States and a co-exclusive sublicense in the remainder of the world, excluding Canada, to four U.S. patents and 26 patent applications relating to genes in the cannabis plant that are required for the production of cannabinoids in the cannabis plant or any microorganism, including yeast or bacteria. Three of these patents are essential for all the cannabinoids' core biosynthesis and one is specific for CBC and derivatives. The Anandia Sublicense continues through the life of the last-to-expire patent, which is expected to be in 2035.

In December 2016, we entered into a sponsored research agreement with the University of Virginia ("UVA") and an exclusive license agreement with the University of Virginia Patent Foundation d/b/a University of Virginia Licensing & Ventures Group ("UVA LVG") pursuant to which we invested approximately $1 million over a three-year period with UVA to work on the creation of unique industrial hemp plants with guaranteed levels of THC below the legal limits and to optimize other desirable hemp plant characteristics to improve the plant's suitability for growing in Virginia and other legacy tobacco regions in the United States.

On October 19, 2017, we announced that UVA had completed its first harvest of our hemp plants and identified several promising hemp varieties that could form the foundation for commercial hemp production throughout the legacy tobacco regions of the United States. The 22nd Century-UVA hemp field trials used multiple varieties of hemp. In 2018 and 2019, we continued to use our proprietary hemp plants for plantings with UVA in Virginia. UVA and 22nd Century conducted all activities in this scientific collaboration within the parameters of state and federal licenses and permits held by UVA for such work. The agreements with UVA and UVA LVG grant us exclusive rights to commercialize all results of the collaboration in consideration of royalty payments by our Company to UVA LVG. This project with UVA completed in December 2019 and all seeds and plants were transferred to KeyGene for further research and development.

Through our partnership with KeyGene, we have completed a deep analysis of several hemp/cannabis lines, established and expanded a proprietary cannabis genomic database, began the sequencing and development of high-quality de novo assemblies of several hemp/cannabis plant lines, and developed novel laboratory analysis techniques. These activities will facilitate our on-going hemp/cannabis research efforts focused on developing hemp/cannabis plants with exceptional cannabinoid profiles and other superior agronomic traits for medical, therapeutic and agricultural uses. Towards this end, we have identified several lines with superior cannabinoids and terpenoids profiles using standard genomics and molecular breeding technologies. Also, we have developed metabolomics methods, male-female flower induction, and rapid cycle breeding.

On February 10, 2021, we announced that we have developed and launched a new, cutting-edge technology platform that will enable us and our strategic partners to quickly identify and incorporate commercially valuable traits of hemp/cannabis plants to create new, stable hemp/cannabis lines. The platform incorporates a suite of proprietary molecular tools and a large library of genomic markers and gene-trait correlations. The platform was developed in collaboration with researchers at KeyGene, a global leader in plant research involving high-value genetic traits and increased crop yields. Using this new breeding technology, we have already characterized millions of high-value single nucleotide polymorphisms (SNPs). SNPs are molecular markers or guideposts within a plant's genome that indicate important variations in Deoxyribonucleic acid (DNA) sequences. Targeting these newly identified SNPs, we were able to locate and isolate specific sections of genetic code from genome assemblies present in our state-of-the-art hemp/cannabis bioinformatics database.

Our bioinformatics database continues to grow and already contains hundreds of hemp/cannabis genomes and thousands of expression datapoints across a wide array of hemp/cannabis varieties and phenotypes. The ability to identify specific genetic variations allows researchers to isolate high-value traits, like increased CBD or tetrahydrocannabinol (THC) production, and then introduce those traits in new plant lines using modern plant breeding techniques, including trait tracking using molecular marker profiles and proprietary accelerated breeding.

On December 14, 2021, we announced a three-way non-exclusive agreement to license the Anandia biosynthesis intellectual property jointly owned with Aurora to Cronos Group Inc., intended to assist in the advancement of research and development on the biosynthesis of cannabinoids.

On February 23, 2022, we made a breakthrough in our hemp/cannabis plant research. We successfully transformed the hemp/cannabis plant genome using a proprietary plant transformation and regeneration technology, resulting in clear protein expression by the introduced genes. We are one of the first companies to show proof of the successful modification of the hemp/cannabis plant genome via transformation techniques directly leading to functional protein expression in hemp/cannabis. This new transformation methodology is a critical enabling technology that dramatically enhances our ability to directly and quickly modify specific target genes in hemp/cannabis. This unique know-how adds another essential tool to our modern plant science capabilities that also includes an extensive library of hemp and cannabis germplasm, a genome database, marker-assisted, rapid-cycle molecular breeding, and mutagenesis, all supported by KeyGene's bioinformatics and genome sequencing capabilities utilizing machine learning and artificial intelligence. Together, these tools are being used to create new, proprietary hemp/cannabis plants tailored to differentiate the content of specific major and minor cannabinoids, terpenoids or eliminate unwanted metabolites to develop new commercial lines tailored to the preferences and needs of end-users, often at a fraction of the time and cost of traditional breeding methods.

In the second quarter of 2022, a significant milestone in our research was the development of gene-editing transformation technology to create non-GMO plants in hemp/cannabis. We led the research with our partner KeyGene for this breakthrough in hemp/cannabis using a proprietary plant transformation and regeneration technology. This development allows us to use macronuclease constructs to gene edit the cannabis biosynthesis pathway. Another 2022 milestone from the KeyGene cannabis collaboration was the successful development of the directed mutagenesis program targeting 30 genes involved in cannabinoid biosynthesis, disease resistance, yield, and terpene regulations. This program will deliver a number of mutational changes (non-GMO) to relevant commercial traits.

In April 2022, we signed a development agreement and license of our hemp/cannabis lines to Extractas Bioscience (Australia). This agreement gives us the capability to enter the Asian/ Pacific region and test our lines for commercialization in the southern hemisphere. In addition, we extended for 2 years our development and exclusive IP license with CannaMetrix company. This collaboration is developing technology based on a cell-based assay for quantifying the potency (ED50) and efficacy of one or more cannabinoids and terpenoids, alone or in combination, using a cellular transduction mechanism.

Government Regulation

The development, testing, manufacturing, and marketing of our products and potential products are subject to extensive regulation by governmental authorities in the United States and throughout the world.

Tobacco

The Family Smoking Prevention and Tobacco Control Act ("Tobacco Control Act") provides the FDA with broad authority to regulate the design, manufacture, packaging, advertising, promotion, sale and distribution of tobacco products; the authority to require disclosures of related information; and the authority to enforce the Tobacco Control Act and related regulations. While the Tobacco Control Act prohibits the FDA from banning cigarettes outright, or mandating that nicotine levels be reduced to zero, it does allow the FDA to require the reduction of nicotine or other compounds in tobacco and cigarette smoke. The FDA has authority to restrict marketing and advertising, impose regulations on packaging, mandate warnings and disclosure of flavors or other ingredients, prohibit the sale of tobacco products with certain flavors or other characteristics, limit or prohibit the sale of tobacco products by certain retail establishments and the sale of tobacco products in certain packaging sizes, and seek to hold retailers and distributors responsible for the adverse health effects associated with both smoking and exposure to environmental tobacco smoke. In 2009, the Tobacco Control Act also banned all sales in the United States of cigarettes with flavored tobacco (other than menthol). As of June 2010, all cigarette companies were required to cease use of the terms "low tar," "light" and "ultra light" in describing cigarettes sold in the United States.

The Tobacco Control Act, its implementing regulations and its 2016 deeming regulations establish broad FDA regulatory authority over all tobacco products and, among other provisions:

- impose restrictions on the advertising, promotion, sale and distribution of tobacco products;
- establish pre-market review pathways for new and modified tobacco products;
- prohibit any express or implied claims that a tobacco product is or may be less harmful than other tobacco products without FDA authorization;
- authorize the FDA to impose tobacco product standards that are appropriate for the protection of the public health; and
- equip the FDA with a variety of investigatory and enforcement tools, including the authority to inspect product manufacturing and other facilities.

Manufacturers of tobacco products must comply with FDA regulations which require, among other things, compliance with the FDA's evolving regulations on Current Good Manufacturing Practices ("cGMP(s)"), which are enforced by the FDA through its facilities inspection program. The manufacture of products is subject to strict quality control, testing and record keeping requirements, and continuing obligations regarding the submission of safety reports and other post-market information. The FDA has several investigatory and enforcement tools available to it, including document requests and other required information submissions, facility inspections, examinations and investigations, injunction proceedings, monetary penalties, product withdrawal and recall orders, and product seizures.

In April, 2022, the FDA announced proposed product standards to prohibit menthol as a characterizing flavor in cigarettes (Notice of Proposed Rule Making, NPRM) and prohibit all characterizing flavors (other than tobacco) in cigars. We provided a robust response to the public consultation on the rule in August 2022. We supported the proposed ban of menthol in highly addictive cigarettes and maintain that this rule should not extend to the companies previously authorized PMTA and MRTP products. In January 2023, the Semi-Annual Agenda for Fall 2022 was released in the US. Here, the Department of Health and Human Services (HHS), informed that it currently intends to issue a Final Rule on Menthol in Cigarettes. This product standard would prohibit menthol as a characterizing flavor in cigarettes, and is currently indicated to be issued in August, 2023. Similarly, in 2022, the State of California banned tobacco retailers from selling most flavored and menthol tobacco products, including VLN® Menthol King. The state of Massachusetts has similar laws prohibiting the sale of flavored tobacco sales, including menthol cigarettes. There has been increasing activity on the state and local levels with respect to scrutiny of menthol and flavored tobacco products.

We expect significant regulatory developments to take place over the next few years in many markets, driven principally by the World Health Organization's Framework Convention on Tobacco Control ("FCTC"). The FCTC is the first international public health treaty on tobacco, and its objective is to establish a global agenda for tobacco regulation with the purpose of reducing initiation of tobacco use and encouraging cessation.

Hemp/Cannabis

On December 20, 2018, the Agricultural Improvement Act of 2018, which is also known as the "2018 Farm Bill," was enacted and legalized hemp and hemp products under U.S. federal law, but with compliance still being required with all applicable state hemp laws and all regulations developed by the USDA. In addition, the FDA is regulating products derived from hemp, including CBD, for compliance under the Federal Food, Drug and Cosmetic Act and has issued several warning letters to firms marketing CBD products to treat disease or for other therapeutic uses. Under the Federal Food, Drug and Cosmetic Act, any product intended to affect the structure or function of the body of humans or animals is considered a drug that must receive premarket approval by the FDA through its new drug application process.

As of February 1, 2022, (i) federal law and the laws of 47 states in the United States and the District of Columbia have legalized hemp, (ii) 37 states in the United States, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands have enacted laws and/or regulations that recognize, in one form or another, legitimate medical uses for cannabis/marijuana and consumer use of cannabis/marijuana in connection with medical treatment, and (iii) 18 states in the United States, the District of Columbia, Guam, and the Northern Mariana Islands have legalized cannabis/marijuana for adult recreational use. Many other states are considering similar legislation. Conversely, under the federal CSA, the policies and regulations of the federal government and its agencies are that marijuana has no medical benefit and a range of activities are prohibited, including cultivation, possession, personal use, and interstate distribution of marijuana. In the event the U.S. Department of Justice begins strict enforcement of the CSA in states that have laws legalizing medical and/or adult recreational marijuana, there may be a direct and adverse impact to any future business or prospects that we may have in the marijuana business. Even in those jurisdictions in which the manufacture and use of medical marijuana has been legalized at the state level, the possession, use, and cultivation of marijuana all remain violations of federal law that are punishable by imprisonment and substantial fines. Moreover, individuals and entities may violate federal law if they intentionally aid and abet another in violating these federal controlled substance laws or conspire with another to violate them.

We currently conduct sponsored research on hemp in Maryland and the Netherlands with third parties that possess all necessary permits and licenses to engage legally in such activities. We have conducted hemp research in Virginia, Oregon, and Canada with third-parties and in Colorado and New York with Company personnel, while possessing all necessary permits and licenses to engage legally in such activities. In order to carry out research in other countries, similar licenses are required to be issued by the relevant authority in each country.

Environmental Regulations

We are subject to a variety of federal, state and local environmental laws and regulations. We have developed specific programs across our business units for ensuring high standards of environmental compliance, including, standard operating practices and procedures at our manufacturing facility as well at our research and development centers. We believe that our manufacturing facility complies with all federal, state, and local environmental regulations, including the Clean Air Act, the Clean Water Act, and the Resource Conservation and Recovery Act.

In addition, any new products introduced by us are subject to a comprehensive environmental assessment by an independent third-party expert, including an assessment of how such products may create environmental risks. For our PMTA product, the FDA prepared a programmatic environmental assessment (PEA), based on our submitted data in accordance with the Council on Environmental Quality's regulations (40 CFR 1500-1508) implementing the National Environmental Policy Act (NEPA) and FDA's NEPA regulations (21 CFR 25.40). The PEA concluded that the marketing orders would have no significant impact and that environmental impact statements would not be required.

Excise Taxes

Tobacco products are subject to substantial excise taxes in the U.S. and other countries. Significant increases in tobacco-related taxes or fees have been proposed or enacted and are likely to continue to be proposed or enacted at the federal, state and local levels within the U.S. and other countries. The frequency and magnitude of excise tax increases can be influenced by various factors, including the composition of executive and legislative bodies. Federal, state and local cigarette excise taxes have increased substantially over the past two decades. Tax increases have an adverse impact on sales of tobacco products.

Competition

It is possible that our VLNC tobacco cigarettes may compete with FDA-approved smoking cessation aids. In the market for FDA-approved smoking cessation aids, our principal competitors would include Pfizer Inc., GlaxoSmithKline plc, Perrigo Company plc, Novartis International AG, and Niconovum AB, a subsidiary of Reynolds American Inc. The industry consists of major domestic and international companies, most of which have existing relationships in the markets into which we plan to sell, as well as financial, technical, marketing, sales, manufacturing, scaling capacity, distribution and other resources, and name recognition substantially greater than ours. We are also aware that several domestic cigarette companies and other research groups are working to research and grow reduced nicotine tobacco and have filed patent applications.

Cigarette and filtered cigar companies compete primarily on the basis of product quality, brand recognition, brand loyalty, taste, innovation, packaging, service, marketing, advertising, retail shelf space, and price. Cigarette sales can be significantly influenced by weak economic conditions, erosion of consumer confidence, competitors' introduction of low-price products or innovative products, higher taxes, higher absolute prices and larger gaps between price categories, and product regulation that diminishes the ability to differentiate tobacco products. Domestic cigarette competitors included Philip Morris USA Inc., Reynolds American Inc., ITG Brands, and Vector Group Ltd. International competitors included Philip Morris International Inc., British American Tobacco, JT International SA, Imperial Brands plc, and regional and local tobacco companies; and in some instances, government-owned tobacco enterprises such as the China National Tobacco Corporation.

In the hemp/cannabis and hop industries, there are numerous companies conducting research and development on the hemp/cannabis and hop plants in order to develop new and differentiated products. Our competitors in the hemp/cannabis industry are primarily smaller or niche companies focused in a specific product or service as opposed to our vertically integrated business model. Our competitors may render our technologies obsolete by advances in existing technological approaches or the development of new or different approaches, potentially eliminating the advantages that we believe we derive from our research approach and proprietary technologies.

Human Capital Resources

As of December 31, 2022, we had 198 employees, of which 99 are attributable to the acquisition of GVB. Substantially all employees are located in the United States and we consider our employee relations to be good. Our human capital resource objectives are designed to attract, and retain, highly motivated and well qualified employees. We believe that we offer a competitive compensation package and have also worked diligently to provide a flexible and safe work environment.

Corporate Information

22nd Century Group, Inc. was incorporated under the laws of the State of Nevada on September 12, 2005 under the name Touchstone Mining Limited. On January 25, 2011, we entered into a reverse merger transaction with 22nd Century Limited, LLC, which we refer to herein as the "merger." Upon the closing of the merger, 22nd Century Limited, LLC became our wholly-owned subsidiary. After the merger, we succeeded to the business of 22nd Century Limited, LLC as our sole line of business.

22nd Century Limited, LLC was originally formed as a New York limited liability company on February 20, 1998 as 21st Century Limited, LLC and subsequently merged with a newly-formed Delaware limited liability company, 22nd Century Limited, LLC, on November 29, 1999.

We are a Nevada corporation and our corporate headquarters is located at 500 Seneca Street, Suite 507, Buffalo, New York 14204. Our telephone number is (716) 270-1523. Our internet address is www.xxiicentury.com. All of our filings with the Securities and Exchange Commission, including our Annual Reports on Form 10-K, our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K can be accessed free of charge through our website promptly after filing; however, in the event that the website is inaccessible, we will provide paper copies of our most recent Annual Report on Form 10-K, the most recent Quarterly Report on Form 10-Q, Current Reports filed or furnished on Form 8-K, and all related amendments, excluding exhibits, free of charge upon request. These filings are also accessible on the SEC's website at www.sec.gov. We do not incorporate the information on our website into this Annual Report on Form 10-K and our web site address is included as an inactive textual reference only.

Item 1A. Risk Factors-

You should carefully consider the risk factors set forth below and in other reports that we file from time to time with the Securities and Exchange Commission and the other information in this Annual Report on Form 10-K. The matters discussed in the risk factors, and additional risks and uncertainties not currently known to us or that we currently deem immaterial, could have a material adverse effect on our business, financial condition, results of operation and future growth prospects and could cause the trading price of our common stock to decline.

Risks Related to Our Business and Operations

We have had a history of losses and we may be unable to achieve and sustain profitability and positive cash flows from operations.

We have experienced net losses of approximately $59.8 million and $32.6 million during the years ended December 31, 2022 and 2021, respectively, and negative cash flow from operations of approximately $51.7 million during the year ended December 31, 2022.

While our current balance of cash and cash equivalents, short-term investment securities, working capital, and proceeds from senior secured credit facility are adequate to sustain our current planned operations, generating positive cash flows in the future will depend on our ability to successfully generate revenue from our contract manufacturing operations and sales of our VLN® cigarettes and hemp based cannabinoid products as well as our ability to cost-effectively develop, create, acquire, sell and/or market other proprietary tobacco and hemp products, and/or generate royalty revenue from the licensing of our intellectual property. There is no guarantee that we will be able to achieve or sustain positive cash flows and profitability in the future. Our inability to successfully achieve positive cash flows and profitability will decrease our long-term viability and prospects.

Our competitors generally have, and any future competitors may have, greater financial resources and name recognition than we do, and they may therefore develop products or other technologies similar or superior to ours, or otherwise compete more successfully than we do.

In the tobacco industry, we are competing with large tobacco companies and large pharmaceutical companies that have greater resources that us. The tobacco industry consists of major domestic and international companies, most of which have existing relationships in the markets in which we plan to sell, as well as financial, technical, research and development, marketing, sales, manufacturing, scaling capacity, distribution, lobbying and other resources and name recognition substantially greater than ours. In addition, we expect new competitors will enter the markets for similar tobacco products in the future and the nature and extent of this market entrance cannot be quantified at this time. In the cannabis industry, many large companies are entering into the cannabis space, along with smaller regional companies and competition from the black market.

Potential customers may choose to do business with more established competitors because of their perception that our competitors are more stable, can scale operations more quickly, have greater manufacturing capacity, have robust marketing and sale programs and lend greater credibility to governmental regulators and others. In addition, large companies have the ability to provide entry-level pricing for premium products in order make us less competitive. If we

are unable to compete successfully against larger companies with more financial resources and name recognition, our business and prospects would be materially adversely affected.

Our competitors may develop products that are less expensive, safer or otherwise more appealing, which may diminish or eliminate the commercial success of our VLN® cigarettes or any other potential products that we may commercialize.

If our competitors develop very low nicotine tobacco without infringing on our intellectual property or other products that are less expensive, safer or otherwise more appealing than our VLNC cigarettes or any of our other potential products, or that reach the market before ours, we may not achieve commercial success. Currently, there are numerous companies developing Modified Risk Tobacco products, working to develop low nicotine tobacco and other tobacco alternative products in an effort to provide products that are potentially safer for human consumption or to otherwise assist consumers to cease or begin to switch from smoking. If one of such competitors develops a cigarette that is safe for human consumption, a safer alternative for nicotine that is widely accepted, superior low nicotine tobacco or otherwise develops a superior quitting method, it could render our VLNC tobacco and cigarettes obsolete, which would have a material adverse impact on our business and operations and our ability to achieve profitability.

In the cannabis industry, there are numerous companies conducting research and development on the cannabis plant in order to develop new and differentiated products and many companies are selling hemp and cannabis-derived products. Our competitors may render our technologies obsolete by advances in existing technological approaches or the development of new or different approaches, potentially eliminating the advantages that we believe we derive from our research approach and proprietary technologies.

Our competitors may:

- develop and market similar or new products that are less expensive, safer, or otherwise more appealing than our products;
- develop similar or new technologies and products that render our products obsolete;
- operate larger research and development programs or have substantially greater financial resources than we do;
- have greater success in recruiting skilled technical and scientific workers from the limited pool of available talent;
- more effectively negotiate third-party licenses and strategic relationships;
- commercialize competing products before we or our partners can launch our products;
- be more effective in marketing and creating brand awareness of their products that we are;
- develop tobacco or hemp plants with superior traits to ours;
- initiate or withstand substantial price competition more successfully than we can; and/or
- take advantage of acquisition or other opportunities more readily than we can.

Our research and development process may not develop marketable products cost-effectively or at all, which would result in loss of our investment into such process.

We do not know whether our research and development process will result in marketable products. Even if we develop marketable products, we may not be able to obtain the necessary approvals or marketing authorizations for these potential products or our anticipated time of bringing these potential products to the market may be substantially delayed. The development of new products is costly, time-consuming, and has no guarantee of success. Any such delays or the inability to effectively develop new products in a cost-effective manner, or at all, would have a material adverse effect on our business and a loss of our financial resources.

We may be unable to successfully integrate GVB's operations into ours and, even if successfully integrated, we may be unable achieve the expected benefits of such acquisition.

The integration of an acquired company requires, among other things, coordination of administrative functions, research and development operations, accounting and finance functions, and the expansion of information and management systems. Integration, especially a large integration such as the integration of GVB, may prove to be difficult due to the necessity of coordinating geographically separate organizations and integrating key personnel with disparate business backgrounds and accustomed to different corporate cultures. Any difficulties or problems encountered in the integration of GVB's business or operations could have a material adverse effect on our business.

Even if successfully integrated, there can be no assurance that our operating performance after an acquisition such as the acquisition of GVB will be successful or will fulfill management's objectives.

We may continue to acquire or invest in other companies, which may divert our management's attention, result in additional dilution to our stockholders, and consume resources that are necessary to sustain our business or result in losses.

We may continue to acquire or invest in complementary solutions, services, technologies, or businesses in the future, such as our acquisition of GVB. We may also enter into relationships with other businesses to expand our intellectual property portfolio, which could involve preferred or exclusive licenses or investments in other companies. Negotiating these transactions can be time-consuming, difficult and expensive, and our ability to complete these transactions may often be subject to conditions or approvals that are beyond our control. Consequently, these transactions, even if undertaken and announced, may not close or may not yield the benefits that we expect. In addition, we may only be able to conduct limited due diligence on an acquired company's operations. Following an acquisition, we may be subject to liabilities arising from an acquired company's past or present operations and these liabilities may be greater than the warranty and indemnity limitations that we negotiate. Any liability that is greater than these warranty and indemnity limitations could have a negative impact on our financial condition.

Acquisitions may also disrupt our business, divert our resources, and require significant management attention that would otherwise be available for the development of our business. Moreover, the anticipated benefits of any acquisition, investment, or business relationship may not be realized or we may be exposed to unknown liabilities, including litigation against the companies that we may acquire.

The coronavirus pandemic (COVID-19) or another pandemic may cause a variety of business disruptions and future business risks.

The COVID-19 pandemic previously disrupted our business operations and there is a risk that state and federal authorities' responses to the COVID-19 pandemic or another pandemic may disrupt our business in the future. The COVID-19 pandemic caused delays by third party providers of goods or services to our business, the inability to operate in-person at our offices, interruptions to our sales, research and development, and administrative activities, and disruptions to our manufacturing operations, including the ability to staff our manufacturing operations at full capacity or at all. At times during 2020 and 2021, we were unable to have our full staff (or any staff) in our laboratory in Buffalo (and subsequently in Rockville) and some of our external research and development partners operated (or are still operating) on a modified or limited schedule, which slowed our research activities.

The future extent of the impact of the COVID-19 pandemic or another pandemic, including our ability to execute our business strategies as planned, will depend on future developments, including the duration and severity of the pandemic, which are highly uncertain and cannot be predicted.

The failure of our information systems to function as intended or their penetration by outside parties with the intent to corrupt them could result in business disruption, litigation and regulatory action, and loss of revenue, assets, or personal or confidential data (cybersecurity).

We use information systems to help manage business processes, collect and interpret business data and communicate internally and externally with employees, suppliers, customers and others. Some of these information systems are managed by third-party service providers. We have backup systems and business continuity plans in place, and we take care to protect our systems and data from unauthorized access. However, a failure of our systems to function as intended, or penetration of our systems by outside parties intent on extracting or corrupting information or otherwise disrupting business processes, could place us at a competitive disadvantage, result in a loss of revenue, assets or personal or other sensitive data, litigation and regulatory action, cause damage to our reputation and that of our brands and result in significant remediation and other costs. Any cybersecurity incident could cause substantial harm to our business and result in regulatory action, fines, and/or substantial costs.

We have limited experience in managing growth. If we fail to manage our growth effectively, we may be unable to execute our business plan or to address competitive challenges adequately.

From 2013 to December 31, 2022, we grew from nine (9) employees to one hundred ninety-eight (198) employees. The continued future growth in our business will place a significant strain on our managerial, administrative, operational, financial, information technology and other resources. We intend to continue to expand our overall business, customer base, employees and operations, which will require substantial management effort and significant additional investment in our infrastructure. We will be required to continue to improve our operational, financial and management controls and our reporting procedures and we may not be able to do so effectively. As such, we may be unable to manage our growth effectively and such failure would have a material adverse impact on our operations.

Business interruptions, whether caused by natural disaster, terrorism, economic downturns, global pandemics or other events, could negatively impact our business.

A natural disaster (such as an earthquake, hurricane, fire, or flood), pandemics (including the COVID-19 pandemic), widespread power outage or internet failure or hack, or an act of terrorism could cause substantial delays in our operations, damage or destroy our equipment or facilities, and cause us to incur additional expenses and lose revenue. The insurance we maintain against natural disasters may not be adequate to cover our losses in any particular case, which would require us to expend significant resources to replace any destroyed assets, thereby materially and adversely affecting our financial condition and prospects. Other global incidents could have a similar effect of disrupting our business to the extent they reach and impact the areas in which we operate, the availability of inventory we need, the customers we serve, the partners on whom we rely for products or services or the employees who operate our businesses. For example, the outbreak of COVID-19 or another pandemic could disrupt our supply chain for tobacco, as well as negatively impact employee productivity, including affecting the availability of employees reporting for work. Any business interruption caused by such unforeseen events could have a material adverse impact on our business and operations.

Risks Related to the Tobacco Industry

We may be unsuccessful in our efforts to commercialize our VLNC tobacco as a Modified Exposure Cigarette.

While we have received authorization for our MRTP application by the FDA and have been rolling out our VLN® in select markets across the United States and abroad, there are no guarantees regarding the commercial viability of our VLNC tobacco cigarettes. To date, there has never been a comparable product sold in the marketplace and we have only rolled out the cigarettes on a limited basis. These products may not achieve consumer acceptance at levels that make the product commercially viable for profitable sales. In addition, the process of rolling out such product and creating consumer awareness could take longer and cost more than we expect. Further, on July 28, 2017, the FDA publicly announced that it intends to implement new regulations that will mandate minimally or non-addictive levels of nicotine in all cigarettes sold in the U.S. There can be no assurance that the FDA will implement such new regulations or, if implemented, when such regulations would take effect or whether such regulations would increase or create demand for our VLNC cigarettes.

The commercial success of our VLNC tobacco cigarettes will depend on a number of factors, including, but not limited to our ability to:

- achieve, maintain and grow market acceptance of, and demand for, such products;
- successfully create consumer awareness of such products;
- market the product with the phrase "*Helps You Smoke Less*";
- maintain, manage or scale the necessary sales, marketing, manufacturing and other capabilities and infrastructure that are required to successfully commercialize such products;
- grow or otherwise maintain an adequate supply of VLNC tobacco;
- maintain and extend intellectual property protection for such products;
- comply with applicable legal and regulatory requirements, including FDA and MSA regulations on advertising;
- competitively price our products;
- compete with other similar products or new technologies (if any);
- obtain cost-effective distribution outlets; and
- effectively sell our products into established markets where there is substantial market dominance by large tobacco enterprises.

If we are unsuccessful in commercializing our VLNC tobacco cigarettes, or such commercialization takes longer or costs more than we currently expect, our financial results, business and future prospects would be materially adversely effected.

We have limited experience marketing and selling Modified Exposure Cigarettes and our working capital and inventory estimates based on demand expectations may be incorrect, which could harm our operating results and financial condition.

While members of management and our board of directors are experienced in the selling of conventional cigarette products, we have limited experience in selling Modified Exposure Cigarettes. As we work towards commercializing one or more of our potential products for sale, including our VLN cigarettes, we base our working capital and inventory decisions on management's estimates of future demand. If demand for such potential new products does not increase as quickly as we have estimated, our inventory costs and working capital expenses could rise, and our business and operating results could suffer. Alternatively, if we experience sales in excess of our estimates, our working capital and inventory needs may be higher than those currently anticipated. Since our VLNC tobacco is not widely available and must be grown specifically for our potential products, any shortage in such tobacco could prevent us from increasing sales to meet demand and any surplus could result in inventory obsolescence and become a total loss.

Our inability to incorrectly estimate demand for future products could negatively harm our operating results and financial condition.

The manufacturing of tobacco products subjects us to significant governmental regulation and the failure to comply with such regulations could have a material adverse effect on our business and subject us to substantial fines or other regulatory actions.

Companies that manufacture and/or sell tobacco products face significant governmental regulation, especially in the United States pursuant to the Tobacco Control Act, including but not limited to efforts aimed at reducing the incidence of tobacco use, restricting marketing and advertising, imposing regulations on packaging, mandating warnings and disclosure of flavors or other ingredients, prohibiting the sale of tobacco products with certain flavors or other characteristics, requiring compliance with certain environmental standards, limiting or prohibiting the sale of tobacco products by certain retail establishments and the sale of tobacco products in certain packaging sizes, and seeking to hold retailers and distributors responsible for the adverse health effects associated with both smoking and exposure to environmental tobacco smoke.

Manufacturers of tobacco products must comply with FDA regulations which require, among other things, compliance with the FDA's evolving regulations on Current Good Manufacturing Practices ("cGMP(s)"), which are enforced by the FDA through its facilities inspection program. The manufacture of products is subject to strict quality control, testing and record keeping requirements, and continuing obligations regarding the submission of safety reports and other post-market information. We cannot guarantee that our current manufacturing facility will pass FDA inspections and/or similar inspections in foreign countries to produce our tobacco products, or that future changes to cGMP manufacturing standards will not also negatively affect the cost or sustainability of our manufacturing facility.

We and our customers for whom we manufacture tobacco products also face significant governmental regulation, including efforts aimed at reducing the incidence of tobacco use. Actions by the FDA and other federal, state or local governments or agencies may impact the adult tobacco consumer acceptability of or access to tobacco products (for example, through product standards proposed by the FDA for nicotine and flavors including menthol), delay or prevent the launch of new or modified tobacco products or products with claims of reduced risk, require the recall or other removal of tobacco products from the marketplace, impose additional manufacturing, labeling or packing requirements, interrupt manufacturing or otherwise significantly increase the cost of doing business. Any one or more of these actions may have a material adverse impact on us or the business of our customers for whom we make tobacco products, which could have a negative impact on our results of operations.

We expect significant regulatory developments to take place over the next few years in many markets, driven principally by the World Health Organization's Framework Convention on Tobacco Control ("FCTC"). The FCTC is the first international public health treaty on tobacco, and its objective is to establish a global agenda for tobacco regulation with the purpose of reducing initiation of tobacco use and encouraging cessation. In addition, the FCTC has led to increased efforts by tobacco control advocates and public health organizations to reduce the appeal of tobacco products. Our operating results could be significantly affected by any significant increase in the cost of complying with new regulatory requirements.

Compliance with current and future regulations regarding tobacco could have a material impact on our business and operations and could result in fines, government actions to restrict or prevent sales of products, as well as result in substantial costs and expenses.

We may become subject to litigation related to cigarette smoking and/or exposure to environmental tobacco smoke, or ETS, which could severely impair our results of operations and liquidity.

Although we are not currently subject to legal proceedings related to cigarette smoking or ETS, we may become subject to litigation related to the sale of our Modified Exposure Cigarettes or other tobacco products we sell or manufacture in the future. Legal proceedings covering a wide range of matters related to tobacco use are pending or threatened in various U.S. and foreign jurisdictions. Various types of claims are raised in these proceedings, including product liability, consumer protection, antitrust, tax, contraband shipments, patent infringement, employment matters, claims for contribution, and claims of competitors and distributors.

Litigation is subject to uncertainty and it is possible that there could be adverse developments in pending cases. An unfavorable outcome or settlement of pending tobacco related litigation could encourage the commencement of additional litigation. The variability in pleadings, together with the actual experience of management in litigating claims, demonstrates that the monetary relief that may be specified in a lawsuit bears little relevance to the ultimate outcome.

Damages claimed in some tobacco-related litigation are significant and, in certain cases, range into the billions of dollars. We anticipate that new cases will continue to be filed. The FCTC encourages litigation against tobacco product manufacturers. It is possible that our results of operations, cash flows, or financial position could be materially affected by an unfavorable outcome or settlement of litigation.

Our NASCO production facility is integral to our tobacco business and adverse changes or developments affecting our facility may have an adverse impact on our business.

Our NASCO production facility is integral to our tobacco business. Adverse changes or developments affecting this facility, including, but not limited to, disease or infestation of our raw materials, a fire, an explosion, a serious injury or fatality, a power failure, a natural disaster, an epidemic, pandemic or other public health crisis, or a material failure of our security infrastructure, could reduce or require us to entirely suspend operations.

A significant failure of our site security measures and other facility requirements, including failure to comply with applicable regulatory requirements, could have an impact on our ability to continue operating under our facility licenses and our prospects of renewing our licenses, and could also result in a suspension or revocation of these licenses.

The loss of a significant customer for whom we manufacture tobacco products could have an adverse impact on our results of operation.

Currently, a significant portion of our revenues (and corresponding accounts receivable) from manufacturing tobacco products are derived from a small number of large customers, and we do not have agreements with such customers requiring them to purchase a minimum amount of products from us or guaranteeing any minimum future purchase amounts from us. Such customers may, at any time, delay or decrease their level of purchases from us or cease doing business with us altogether. Since many of our manufacturing costs are fixed, if sales to such customers cease or are reduced, we may not obtain sufficient purchase orders from other customers necessary to offset any such losses or reductions, which could have a negative impact on our results of operations.

Product liability claims, product recalls, or other claims could cause us to incur losses or damage our reputation.

The risk of product liability claims or product recalls, and associated adverse publicity, is inherent in the development, manufacturing, marketing, and sale of tobacco products. Any product recall or lawsuit seeking significant monetary damages may have a material adverse effect on our business and financial condition. A successful product liability claim against us could require us to pay a substantial monetary award. Though we currently have no pending product liability claims against us, we cannot assure you that such claims will not be made in the future and any such claim could cause us to incur substantial losses or damage our reputation.

Cigarettes are subject to substantial taxes. Significant increases in cigarette-related taxes have been proposed or enacted and are likely to continue to be proposed or enacted in numerous jurisdictions. These tax increases may affect the sales of our potential products and our third-parties customers' tobacco products manufactured at our factory, which could result in decreased sales and profitability of our manufacturing business.

Tax regimes, including excise taxes, sales taxes, and import duties, can disproportionately affect the retail price of manufactured cigarettes versus other tobacco products, or disproportionately affect the relative retail price of our Modified Exposure Cigarettes versus lower-priced cigarette brands manufactured by our competitors. Increases in cigarette taxes are expected to continue to have an adverse impact on sales of cigarettes resulting in (i) lower consumption levels, (ii) a shift in sales from manufactured cigarettes to other tobacco products or to lower-price cigarette categories, (iii) a shift from local sales to legal cross-border purchases of lower price products, and (iv) illicit products such as contraband and counterfeit.

Government mandated prices or taxes, production control programs, shifts in crops driven by economic conditions, climatic or adverse weather patterns may increase the cost or reduce the quality and/or supply of the tobacco and other agricultural products used to manufacture our products.

We depend on a small number of independent tobacco farmers to grow our specialty proprietary tobaccos with specific nicotine contents for our products. As with other agricultural commodities, the price of tobacco leaf can be influenced by imbalances in supply and demand, and crop quality can be influenced by variations in weather patterns, diseases, and pests. This risk is greater for us, as there would be no alternative supply of VLNC tobacco in the event that one of our growers experienced a material adverse event with respect to a particular VLNC tobacco crop or the quantity or quality was not as we anticipated, and we would not be able to supply leaf for our VLN® cigarettes.

We must also compete with other tobacco companies for contract production with independent tobacco farmers. Tobacco production in certain countries is subject to a variety of controls, including government mandated prices and production control programs. Changes in the patterns of demand for agricultural products could cause farmers to plant less tobacco. Any significant change in tobacco leaf prices or taxes, quality and quantity could affect our profitability and our business.

We distribute and sell our products outside of the U.S., which subjects us to other regulatory risks.

In addition to the approval to market and sell our VLNC tobacco cigarettes as a Modified Exposure Cigarette in the U.S., we continue to seek governmental approvals required to market our VLNC tobacco cigarettes and our other products in other countries. Marketing of our products is not permitted in certain countries until we have obtained required approvals or exemptions in these individual countries. The regulatory review process varies from country to country, and approval by foreign governmental authorities is unpredictable, uncertain, and generally expensive. Our ability to market our potential products could be substantially limited due to delays in receipt of, or failure to receive, the necessary approvals or clearances. We anticipate commencing the applications required in some or all of these countries in the future. Failure to obtain necessary regulatory approvals could impair our ability to generate revenue from international sources.

We may become subject to governmental investigations on a range of matters.

Tobacco companies are often subject to investigations, including allegations of contraband shipments of cigarettes, allegations of unlawful pricing activities within certain markets, allegations of underpayment of custom duties and/or excise taxes, and allegations of false and misleading usage of descriptors such as “lights” and “ultra-lights.” We cannot predict the outcome of any investigations to which we may become subject, but we may be materially affected by an unfavorable outcome of potential future investigations.

We may be unsuccessful in anticipating changes in adult consumer preferences, responding to changes in consumer purchase behavior or managing through difficult competitive and economic conditions, which could have an adverse effect on business.

In the tobacco industry, we are subject to intense competition and changes in adult consumer preferences. To be successful, we must:

- anticipate and respond to new and evolving adult consumer preferences;
- develop, manufacture, market and distribute new and innovative products that appeal to adult consumers (including, where appropriate, through arrangements with, or investments in, third parties);
- improve productivity; and
- protect or enhance margins through cost savings and price increases.

The willingness of adult consumers to purchase premium consumer tobacco products, such as our VLNC cigarettes, depends in part on economic conditions. In periods of economic uncertainty, adult consumers may purchase more discount brands and/or, in the case of tobacco products, consider lower-priced tobacco products, which could have a material adverse effect on the business and profitability.

We may be unsuccessful in developing and commercializing adjacent products or processes, including innovative tobacco products that may reduce the health risks associated with certain other tobacco products and that appeal to adult tobacco consumers.

Some innovative tobacco products may reduce the health risks associated with certain other tobacco products, while continuing to offer adult tobacco consumers products that meet their taste expectations and evolving preferences. Examples include tobacco-containing and nicotine-containing products that reduce or eliminate exposure to cigarette smoke and/or constituents identified by public health authorities as harmful, such as electronically heated tobacco products, oral nicotine pouches, and e-vapor products. We may not succeed in our efforts to develop and commercialize any adjacent products.

Further, we cannot predict whether regulators, including the FDA, will permit the marketing or sale of any particular innovative products (including products with claims of reduced risk to adult consumers), the speed with which they may make such determinations or whether regulators will impose an unduly burdensome regulatory framework on such products. In addition, the FDA could, for a variety of reasons, determine that innovative products currently on the market, or those that have previously received authorization, including with a claim of reduced exposure, are not appropriate for the public health and the FDA could require such products be taken off the market. We also cannot predict whether any products will appeal to adult tobacco consumers or whether adult tobacco consumers' purchasing decisions would be affected by reduced-risk claims on such products if permitted. Adverse developments on any of these matters could negatively impact the commercial viability of such products.

If we do not succeed in their efforts to develop and commercialize innovative tobacco products or to obtain regulatory approval for the marketing or sale of products, including with claims of reduced risk, but one or more of our competitors does succeed, we may be at a competitive disadvantage, which could have an adverse effect on our ability to commercialize our products.

An extended disruption at a facility or in service by a supplier, distributor or distribution chain service provider could have a material adverse effect on our business.

We face risks inherent in reliance on one manufacturing facility and a small number of key suppliers, distributors and distribution chain service providers. A pandemic (including COVID-19), natural or man-made disaster or other disruption that affects the manufacturing operations, the operations of any key supplier, distributor or distribution chain service provider or any other disruption in the supply or distribution of goods or services (including a key supplier's inability to comply with government regulations or unwillingness to supply goods or services to a tobacco company) could have a material adverse effect on our business.

The FDA could force the removal of our products from the U.S. market.

The FDA has broad authority over the regulation of tobacco products. The FDA could, among other things, force us to remove from the U.S. market our VLNC tobacco cigarettes even after the FDA authorization on December 17, 2019 of our PMTA or the authorization of our MRTP application on December 23, 2021, for us to market in the U.S. our VLNC tobacco cigarettes, as well as the FDA could levy fines or change their regulations on advertising. In addition, the authorization to market our VLN® cigarettes as MRTP products was granted for a period of five years, which is the maximum duration for a marketing granted order for such products under the Family Smoking Prevention & Tobacco Control Act (PUBLIC LAW 111–31—JUNE 22, 2009). Consequently, the Company will need to reapply to FDA to under a new MRTP application to extend its marketing granted authorization beyond December 23, 2026. The MRTP authorization process is a complex, substantial and lengthy regulatory undertaking. The FDA may or may not grant continued authorization, based on FDA's assessment of whether the product application(s) satisfy the statutory requirements for such an order.. Any adverse action by the FDA to remove our products from the U.S. market or the

failure to have our authorization to market our VLN® cigarettes renewed would have a material adverse impact on our business.

A ban on menthol or flavored tobacco products could have a material adverse impact on our business.

On April 27, 2022, the FDA proposed new rules to prohibit menthol as a characterizing flavor in cigarettes and prohibit all characterizing flavors (other than tobacco) in cigars. There has been increasing activity on the state and local levels with respect to scrutiny of menthol and flavored tobacco products, including a recent law passed by the State of California prohibiting tobacco retailers from selling most flavored and menthol tobacco products, including VLN® Menthol King. If these proposed rules are finalized and implemented, if new rules are proposed or if additional states or governments pass laws similar to the State of California, we could be negatively impacted through decreased sales, a requirement to remove non-compliant tobacco products from the marketplace, associated interruptions in manufacturing or business disruptions. In addition, although we expect that our VLN® Menthol King reduced nicotine cigarettes will be exempted from FDA's menthol ban on cigarettes, there is no guarantee that they will be exempted by the FDA or any other state or local government. Accordingly, the implementation of these proposed or new laws or rules may have a material adverse impact on our results of operations.

Risk Factors Related to the Hemp/Cannabis Industry

Negative press from being in the hemp/cannabis space could have a material adverse effect on our business, financial condition, and results of operations.

The hemp plant and the marijuana plant are both part of the same *cannabis* genus of plant, except that hemp, by definition, has not more than 0.3% THC content and is legal under the federal 2018 Farm Bill and certain state laws, but the same plant with a higher THC content is defined as marijuana, which is legal under certain state laws, is not legal under federal law. The similarities between these plants can cause confusion, and our activities with legal hemp may be incorrectly perceived as us being involved in federally illegal marijuana. Also, despite growing support for the marijuana industry and legalization of marijuana in certain U.S. states, many individuals and businesses remain opposed to the marijuana industry. Any negative press resulting from the incorrect perception that we have entered into the marijuana space could result in a loss of current or future business. It could also adversely affect the public's perception of us and lead to reluctance by new parties to do business with us or to own our common stock. We cannot assure you that additional business partners, including but not limited to financial institutions, banking institutions and customers, will not attempt to end or curtail their relationships with us. Any such negative press or cessation of business could have a material adverse effect on our business, financial condition, and results of operations.

Any business-related cannabinoid production is dependent on laws pertaining to the hemp/cannabis industry.

On December 20, 2018, the Agricultural Improvement Act of 2018, which is also known as the "2018 Farm Bill," was enacted and legalized hemp and hemp products under U.S. federal law, but with compliance still being required with all applicable state hemp laws and all regulations developed by the United States Department of Agriculture ("USDA"). In addition, the FDA is regulating products derived from hemp, including cannabidiol ("CBD"), for compliance under the Federal Food, Drug and Cosmetic Act and has issued several warning letters to firms marketing CBD products to treat disease or for other therapeutic uses. Under the Federal Food, Drug and Cosmetic Act, any product intended to affect the structure or function of the body of humans or animals is considered a drug that must receive premarket approval by the FDA through its new drug application process. Thus, participants in the hemp industry will need to comply with all applicable federal and state laws, rules and regulations in the cultivation, transportation, and sale of hemp and hemp derived products, including the Federal Food, Drug and Cosmetic Act.

Numerous states and countries have enacted laws and/or regulations that recognize, in one form or another, legitimate medical uses for cannabis/marijuana and consumer use of cannabis/marijuana in connection with medical treatment and a smaller subset have legalized cannabis/marijuana for adult recreational use. Many other states are considering similar legislation. Conversely, under the federal Controlled Substance Act (the "CSA"), the policies and regulations of the federal government and its agencies are that marijuana has no medical benefit and a range of activities are prohibited, including cultivation, possession, personal use, and interstate distribution of marijuana. In the event the U.S. Department of Justice begins strict enforcement of the CSA in states that have laws legalizing medical and/or adult

recreational marijuana, there may be a direct and adverse impact to any future business or prospects that we may have in the marijuana business. Even in those jurisdictions in which the manufacture and use of medical marijuana has been legalized at the state level, the possession, use, and cultivation of marijuana all remain violations of federal law that are punishable by imprisonment and substantial fines. Moreover, individuals and entities may violate federal law if they intentionally aid and abet another in violating these federal controlled substance laws or conspire with another to violate them.

Local, state, federal, and international hemp and marijuana laws and regulations are broad in scope and subject to evolving interpretations, which could require us to incur substantial costs associated with compliance requirements. In addition, violations of these laws, or allegations of such violations, could disrupt our business and result in a material adverse effect on our operations. In addition, it is possible that regulations may be enacted in the future that will be directly applicable to our proposed business regarding cannabinoid production. It is also possible that the federal government will begin strictly enforcing existing laws, which may limit the legal uses of the hemp plant and its derivatives and extracts, such as cannabinoids. However, our work in hemp would continue since hemp research, development, and commercialization activities are permitted under applicable federal and state laws, rules, and regulations. We cannot predict the nature of any future laws, regulations, interpretations, or applications, nor can we determine what effect additional governmental regulations or administrative policies and procedures, when and if promulgated, could have on our activities in the legal hemp industry.

A key aspect of the revised strategy for cannabis is to reach an agreement with third parties to research characteristics of the cannabis plant and commercialize patented products through the value chain.

Any inability to produce hemp/cannabis products due to regulatory restrictions or otherwise would have a material adverse impact on our business and operations.

We have limited supply sources for industrial hemp, and price increases or supply shortages of key raw materials could materially and adversely affect our business, financial condition and results of operations.

Our hemp-based cannabinoid products are composed of certain key raw materials. If the prices of such raw materials increase significantly, it could result in a significant increase in our product development costs. If raw material prices increase in the future, we may not be able to pass on such price increases to our customers. A significant increase in the price of industrial hemp or other raw materials that cannot be passed on to customers could have a material adverse effect on our business, financial condition and results of operations.

Our success will depend upon the availability of industrial hemp and other raw materials that permit us to meet our labeling claims and quality control standards. The supply of our industrial hemp is subject to the same risks normally associated with agricultural production, such as climactic conditions, insect infestations and availability of manual labor or equipment for harvesting. Any significant delay in or disruption of the supply of raw materials could substantially increase the cost of such materials, could require product reformulations, the qualification of new suppliers and repackaging and could result in a substantial reduction or termination by us of our sales of certain products, any of which could have a material adverse effect upon us. Accordingly, there can be no assurance that the disruption of our supply sources will not have a material adverse effect on us.

Loss of key contracts with our customer and/or suppliers, renegotiation of such agreements on less favorable terms or other actions these third parties may take could harm our business.

Most of our agreements with customers and suppliers of our industrial hemp and hemp-derived products are short term. The loss of these agreements, or the renegotiation of these agreements on less favorable economic or other terms, could limit our ability to procure raw material to manufacture and sell our products. This could negatively affect our ability to meet consumer demand for our products. Upon expiration or termination of these agreements, our competitors may be able to secure industrial hemp from our existing customers or suppliers which will put the company at a competitive disadvantage in the market.

Our hemp production and processing facilities are integral to our hemp business and adverse changes or developments affecting our facilities may have an adverse impact on our business.

Our hemp processing facilities are integral to our business and the licenses issued by applicable regulatory authorities is specific to each of these facilities. Adverse changes or developments affecting these facilities, including, but not limited to, disease or infestation of our crops, a fire (such as the fire in our Grass Valley, Oregon manufacturing facility), an explosion, a power failure, a serious injury or fatality, a natural disaster, an epidemic, pandemic or other public health crisis, or a material failure of our security infrastructure, could reduce or require us to entirely suspend operations at the affected facilities. While we believe that we maintain sufficient levels of insurance to potentially offset against the losses experienced in such an event, such insurance may not be sufficient to offset all of the costs and losses associated with such event (such as costs associated with finding temporary space and opportunity costs in the form of lost revenue or higher expenses) and in some events the insurance may not cover us at all. With respect to our fire in Grass Valley, while we expect to collect insurance to offset against some of our losses, such insurance will likely not be sufficient to offset against the opportunity costs associated with losing one of our manufacturing facilities.

A significant failure of our site security measures and other facility requirements, including failure to comply with applicable regulatory requirements, could have an impact on our ability to continue operating under our facility licenses and our prospects of renewing our licenses, and could also result in a suspension or revocation of these licenses.

Some jurisdictions may never develop markets for cannabis.

Many jurisdictions place restrictions on or prohibit commercial activities involving cannabis. Such restrictions or prohibitions may make it impossible or impractical for us to enter or expand our operations in such jurisdictions unless there is a change in law or regulation.

There is limited availability of clinical studies related to hemp-based products.

Although hemp plants have a long history of human consumption, there is little long-term experience with human consumption of certain of these innovative product ingredients or combinations thereof in concentrated form. Although we perform research and/or tests the formulation and production of our products, there is limited clinical data regarding the safety and benefits of ingesting industrial hemp-based products. Any instance of illness or negative side effects of ingesting industrial hemp-based products would have a material adverse effect on our business and operations.

Costs associated with compliance with various laws and regulations could negatively impact our financial results.

The manufacture, labeling and distribution of hemp-based cannabinoid products is regulated by various federal, state and local agencies. These governmental authorities may commence regulatory or legal proceedings, which could restrict our ability to market such products in the future. The FDA regulates our products to ensure that the products are not adulterated or misbranded. We may also be subject to regulation by other federal, state and local agencies with respect to our hemp-based products. Our advertising activities are subject to regulation by the FTC under the Federal Trade Commission Act. In recent years, the FTC and state attorneys general have initiated numerous investigations of dietary and nutritional supplement companies and products. Any actions or investigations initiated against us by governmental authorities or private litigants could have a material adverse effect on our business, financial condition and results of operations. Any actions or investigations initiated against us by governmental authorities or private litigants could have a material adverse effect on our business, financial condition and results of operations.

The shifting regulatory environment necessitates building and maintaining of robust systems to achieve and maintain compliance in multiple jurisdictions and increases the possibility that we may violate one or more of the legal requirements applicable to our business and products. If our operations are found to be in violation of any applicable laws or regulations, we may be subject to penalties, including, without limitation, civil and criminal penalties, damages, fines, the curtailment or restructuring of our operations, injunctions, or product withdrawals, recalls or seizures, any of which could adversely affect our ability to operate our business, our financial condition and results of operations.

United States regulations relating to hemp-derived CBD products are unclear and rapidly evolving, and changes may not develop in the timeframe or manner most favorable to our business objectives.

Any participation in the market for hemp-derived CBD products in the United States and elsewhere may require us to employ novel approaches to existing regulatory pathways. Although the passage of the 2018 Farm Bill legalized the cultivation of hemp in the United States to produce products containing CBD and other non-THC cannabinoids, it remains unclear how the FDA will regulate these products, and whether and when the FDA will propose or implement new or additional regulations. While, to date, there are no laws or regulations enforced by the FDA which specifically address the manufacturing, packaging, labeling, distribution, or sale of hemp or hemp-derived CBD products and the FDA has issued no formal regulations addressing such matters, the FDA has issued various guidance documents and other statements reflecting its non-binding opinion on the regulation of such products.

The FDA has stated in guidance and other public statements that it is prohibited to sell a food, beverage or dietary supplement to which THC or CBD has been added. While the FDA does not have a formal policy of enforcement discretion with respect to any products with added CBD, the agency has stated that its primary focus for enforcement centers on products that put the health and safety of consumers at risk, such as those claiming to prevent, diagnose, mitigate, treat, or cure diseases in the absence of requisite approvals. The FDA could also issue new regulations that prohibit or limit the sale of hemp-derived CBD products. Such regulatory actions and associated compliance costs may hinder our ability to successfully compete in the market for any products.

In addition, any products may be subject to regulation at the state or local levels. State and local authorities have issued their own restrictions on the cultivation or sale of hemp or hemp-derived CBD. This includes laws that ban the cultivation or possession of hemp or any other plant of the cannabis genus and derivatives thereof, such as CBD. State regulators may take enforcement action against food and dietary supplement products that contain CBD, or enact new laws or regulations that prohibit or limit the sale of such products.

The regulation of hemp and CBD in the United States has been constantly evolving, with changes in federal and state laws and regulation occurring on a frequent basis. Violations of applicable FDA and other laws could result in warning letters, significant fines, penalties, administrative sanctions, injunctions, convictions or settlements arising from civil proceedings. Unforeseen regulatory obstacles or compliance costs may hinder our ability to successfully compete in the market for such products.

International expansion of our business exposes us to additional regulatory risks and compliance costs.

As we expand to engage in the international sale of our hemp-derived products, we will become subject to the laws and regulations of the foreign jurisdictions in which we operate, or in which we import or export products or materials, including, but not limited to, customs regulations in the importing and exporting countries. The varying laws and rapidly changing regulations may impact our operations and ability to ensure compliance. In addition, we may avail itself of proposed legislative changes in certain jurisdictions to expand our product portfolio, which expansion may include unknown business and regulatory compliance risks. Failure to comply with the evolving regulatory framework in any jurisdiction could have a material adverse effect on our business, financial condition and results of operations.

The cannabis industry and market are relatively new and evolving, which could impact our ability to succeed in this industry and market.

We are operating our business in a relatively new industry and market that is expanding globally. To be competitive, we will need to innovate new products, build brand awareness and make significant investments in our business strategy and production capacity. These investments include introducing new products into the markets in which we operate, adopting quality assurance protocols and procedures, building our international presence and undertaking research and development. These activities may not promote our products as effectively as intended, or at all, and we expect that our competitors will undertake similar investments to compete with us for market share. Competitive conditions, consumer preferences, regulatory conditions, patient requirements, prescribing practices, and spending patterns in this industry and market are relatively unknown and may have unique characteristics that differ from other existing industries and markets and that cause our efforts to further our business to be unsuccessful or to have undesired consequences. As a result, we may not be successful in our efforts to develop new cannabis products and produce and distribute these products in time to be effectively commercialized, or these activities may require significantly more resources than we currently anticipate in order to be successful.

Research regarding the health effects of cannabis is in relatively early stages and subject to further study which could impact demand for cannabis products.

Research and clinical trials on the potential benefits and the short-term and long-term effects of cannabis use on human health remains in relatively early stages and there is limited standardization. As such, there are inherent risks associated with using cannabis and cannabis derivative products. Moreover, future research and clinical trials may draw opposing conclusions to statements contained in articles, reports and studies we relied on or could reach different or negative conclusions regarding the benefits, viability, safety, efficacy, dosing or other facts and perceptions related to cannabis, which could adversely affect social acceptance of cannabis and the demand for any products.

We may be subject to product liability claims.

As a manufacturer and distributor of products designed to be ingested by humans, we face an inherent risk of exposure to product liability claims, regulatory action and litigation if our products are alleged to have caused significant loss or injury. In addition, the manufacture and sale of hemp-derived products involve the risk of injury to consumers due to tampering by unauthorized third parties or product contamination. Previously unknown adverse reactions resulting from human consumption of hemp-derived products alone or in combination with other medications or substances could occur. We may in the future be subject to product liability claims that include, among others, our products caused injury or illness, incorrect labeling, inadequate instructions for use or inadequate warnings concerning possible side effects or interactions with other substances. A product liability claim or regulatory action against us could result in increased costs, could adversely affect our reputation with our consumers generally, and could have a material adverse effect on our business, financial condition and results of operations.

There can be no assurances that we will be able to obtain or maintain product liability insurance on acceptable terms or with adequate coverage against potential liabilities. Such insurance is expensive and may not be available in the future on acceptable terms, or at all. The inability to obtain sufficient insurance coverage on reasonable terms or to otherwise protect against potential product liability claims could prevent or inhibit the commercialization of products.

The presence of trace amounts of THC in our products may cause adverse consequences to users of such products that will expose us to the risk of litigation, liability and other consequences.

Some of our products that contain hemp-derived CBD, or other hemp-derived cannabinoids, may contain trace amounts of THC. THC is a controlled substance in many jurisdictions, including under the federal laws of the U.S. Whether or not ingestion of THC (at low levels or otherwise) is permitted in a particular jurisdiction, there may be adverse consequences to consumers of our products who test positive for any amounts of THC because of the presence of trace amounts of THC in our hemp products. In addition, certain metabolic processes in the body may negatively affect the results of drug tests. Positive tests for THC may expose us to litigation from our consumers, adversely affect our reputation, our ability to obtain or retain customers and individuals' participation in certain athletic or other activities. A claim or regulatory action against us based on such positive test results could materially and adversely affect our business, financial condition, operating results, liquidity, cash flow and operational performance.

Our cannabis operations are subject to risks inherent in an agricultural business.

Our business involves the growing of cannabis, an agricultural product, in certain jurisdictions where that activity is permitted. As such, the business is subject to the risks inherent in the agricultural business, such as insects, plant diseases and similar agricultural risks that may create crop failures and supply interruptions for our customers and there can be no assurance that such risks will not have a similarly material adverse effect on the production of our products.

Hemp is typically harvested in or around the month of October and can be vulnerable to various pathogens including bacteria, fungi, viruses and other miscellaneous pathogens. Such instances often lead to reduced crop quality, stunted growth and/or death of the plant. Moreover, hemp is "phytoremediative" (meaning that it may extract toxins or other undesirable chemicals or compounds from the ground in which it is planted). Various regulatory agencies have established maximum limits for pathogens, toxins, chemicals and other compounds that may be present in agricultural materials. If hemp used in our products is found to have levels of pathogens, toxins, chemicals or other undesirable compounds that exceed limits permitted by applicable law, it may have to be destroyed. Should the hemp used in our products be lost due to pathogens, toxins, chemicals or other undesirable compounds, or if we or our suppliers are otherwise unable to obtain hemp for use in our products on an ongoing basis, it may have a material and adverse effect on our business, financial condition, operating results, liquidity, cash flow and operational performance.

Competition from the illicit cannabis market could impact our ability to succeed.

We face competition from illegal market operators that are unlicensed and unregulated including illegal dispensaries and illicit market suppliers selling cannabis and cannabis-based products. As these illegal market participants do not comply with the regulations governing the cannabis industry, their operations may have significantly lower costs. The perpetuation of the illegal market for cannabis may have a material adverse effect on our business, results of operations, as well as the perception of cannabis use.

Risks Related to Intellectual Property

Certain of our proprietary rights have expired or may expire or may not otherwise adequately protect our intellectual property, products and potential products, and if we cannot obtain adequate protection of our intellectual property, products and potential products, we may not be able to successfully market our products and potential products.

Our commercial success will depend, in part, on obtaining and maintaining intellectual property protection for our technologies, products, and potential products. We will only be able to protect our technologies, products, and potential products from unauthorized use by third parties to the extent that valid and enforceable patents cover them, or to the extent that other market exclusionary rights apply.

The patent positions of life sciences companies, like ours, can be highly uncertain and involve complex legal and factual questions for which important legal principles remain unresolved. No consistent policy regarding the breadth of claims allowed in such companies' patents has emerged to date in the United States. The general patent environment outside the United States also involves significant uncertainty. Accordingly, we cannot predict the breadth of claims that may be allowed or that the scope of these patent rights could provide a sufficient degree of future protection that could permit us to gain or keep our competitive advantage with respect to these products and technology. Additionally, life science companies like ours are often dependent on creating a pipeline of products. We may not be able to develop additional potential products or proprietary technologies that produce commercially viable products or that are themselves patentable.

Our issued patents may be subject to challenge and potential invalidation by third parties and our competitors may develop processes to achieve similar results without infringing on our patents. Changes in either the patent laws or in the interpretations of patent laws in the United States, or in other countries, may diminish the value of our intellectual property. In addition, others may independently develop similar or alternative products and technologies that may be outside the scope of our intellectual property. Should third parties develop alternative methods of regulating nicotine in tobacco or obtain patent rights to similar products or technology without infringing on our intellectual property rights, this may have an adverse effect on our business.

The expiration of a portion of the QPT patent family in 2018 may provide third parties with the freedom to target the QPT gene in the tobacco plant. This could result in experiments to try to reduce nicotine levels in tobacco plants to levels that may satisfy the planned new nicotine reduction regulations coming from the FDA. There can be no assurance about whether any third-parties will or will not be successful in such efforts, how long or short in time such efforts will entail and/or if such efforts will or will not infringe other genes and other intellectual property on which we have continuing patent protection that would need to be used, in combination with QPT, to result in VLNC tobacco. If independent researchers or our competitors are able to successfully reduce nicotine levels in tobacco plants without violating our patent protections, our ability to license our technology would be negatively impacted and we would likely face increased competition.

We also rely on license agreements and trade secrets to protect our technology, products, and potential products, especially where we do not believe patent protection is appropriate or obtainable. Trade secrets, however, are difficult to protect. While we believe that we use reasonable efforts to protect our trade secrets, our own, our licensees' or our strategic partners' employees, consultants, contractors or advisors may unintentionally or willfully disclose our information to competitors. We seek to protect this information, in part, through the use of non-disclosure and confidentiality agreements with employees, consultants, advisors, and others. These agreements may be breached, and we may not have adequate remedies for a breach. In addition, we cannot ensure that those agreements will provide adequate protection for our trade secrets, know-how, or other proprietary information, or prevent their unauthorized use or disclosure.

To the extent that consultants or key employees apply technological information independently developed by them or by others to our products and potential products, disputes may arise as to the proprietary rights of the information, which may not be resolved in our favor. Key employees are required to assign all intellectual property rights in their discoveries to us. However, these key employees may terminate their relationship with us, and we cannot preclude them indefinitely from dealing with our competitors. If our trade secrets become known to competitors with greater experience and financial resources, the competitors may copy or use our trade secrets and other proprietary information in the advancement of their products, methods, or technologies. If we were to prosecute a claim that a third party had illegally obtained and was using our trade secrets, it could be expensive and time consuming and the outcome could be unpredictable. In addition, courts outside the United States are sometimes less willing to protect trade secrets than courts in the United States. Moreover, if our competitors independently develop equivalent knowledge, we would lack any contractual claim to this information, and our business could be harmed.

The ability to commercialize our potential products will depend on our ability to sell such products without infringing the patent or proprietary rights of third parties. If we are sued for infringing intellectual property rights of third parties, such litigation could be costly and time consuming and an unfavorable outcome could have a significant adverse effect on our business.

The ability to commercialize our potential products will depend on our ability to sell such products without infringing the patents or other proprietary rights of third parties. Third-party intellectual property rights in our field are complicated, and third-party intellectual property rights in these fields are continuously evolving. While we have conducted searches for such third-party intellectual property rights, we have not performed specific searches for third-party intellectual property rights that may raise freedom-to-operate issues, and we have not obtained legal opinions regarding commercialization of our potential products. As such, there may be existing patents that may affect our ability to commercialize our potential products.

In addition, because patent applications are published up to 18 months after their filing, and because patent applications can take several years to issue, there may be currently pending third-party patent applications and freedom-to-operate issues that are unknown to us, which may later result in issued patents.

If a third-party claims that we infringe on its patents or other proprietary rights, we could face a number of issues that could seriously harm our competitive position, including:

- infringement claims that, with or without merit, can be costly and time consuming to litigate, can delay the regulatory approval process, and can divert management's attention from our core business strategy;
- substantial damages for past infringement which we may have to pay if a court determines that our products or technologies infringe upon a competitor's patent or other proprietary rights;
- a court order prohibiting us from commercializing our potential products or technologies unless the holder licenses the patent or other proprietary rights to us, which such holder is not required to do;
- if a license is available from a holder, we may have to pay substantial royalties or grant cross licenses to our patents or other proprietary rights; and
- redesigning our process so that it does not infringe the third-party intellectual property, which may not be possible, or which may require substantial time and expense including delays in bringing our potential products to market.

Such actions could harm our competitive position and our ability to generate revenue and could result in increased costs.

Our patent applications may not result in issued patents, which may have a material adverse effect on our ability to prevent others from commercially exploiting products similar to ours.

We own or exclusively control many issued patents and pending patent applications. We cannot be certain that these patent applications will issue, in whole or in part, as patents. Patent applications in the United States are maintained in secrecy until the patents are published or are issued. Since publication of discoveries in the scientific or patent literature tends to lag behind actual discoveries by several months, we cannot be certain that we are the first creator of inventions covered by pending patent applications or the first to file patent applications on these inventions. We also cannot be certain that our pending patent applications will result in issued patents or that any of our issued patents will afford protection against a competitor. In addition, patent applications filed in foreign countries are subject to laws, rules and procedures that differ from those of the United States, and thus we cannot be certain that foreign patent applications related to U.S. patents will be issued. Furthermore, if these patent applications issue, some foreign countries provide significantly less effective patent enforcement than in the United States.

The status of patents involves complex legal and factual questions and the breadth of claims allowed is uncertain. Accordingly, we cannot be certain that the patent applications that we or our licensors file will result in patents being issued, or that our patents and any patents that may be issued to us in the near future will afford protection against competitors with similar technology. In addition, patents issued to us may be infringed upon or designed around by others and others may obtain patents that we need to license or design around, either of which would increase costs and may adversely affect our operations.

We license certain patent rights from third-party owners. If such owners do not properly maintain or enforce the patents underlying such licenses, our competitive position and business prospects could be harmed.

We license rights to third-party intellectual property that is necessary or useful for our business, and we may enter into additional licensing agreements in the future. Our success could depend in part on the ability of some of our licensors to obtain, maintain, and enforce patent protection for their intellectual property, in particular, those patents to which we have secured exclusive rights. Our licensors may not successfully prosecute the patent applications to which we are licensed and may in some instances retain rights to the intellectual property that allows them to compete with us. Even if patents are issued with respect to these patent applications, our licensors may fail to maintain these patents, may determine not to pursue litigation against other companies that are infringing these patents, or may pursue such litigation less aggressively than we could. Without protection for the intellectual property we license, other companies might be able to offer substantially identical products for sale, which could adversely affect our competitive business position and harm our business prospects.

Our worldwide exclusive licenses relating to tobacco from NCSU involve multiple patent families and trade secrets. The exclusive rights under the NCSU agreements expire on the date on which the last patent or registered plant variety covered by the subject license expires in the country or countries where such patents or registered plant varieties are in effect. The NCSU licenses relate predominately to issued patents, and our exclusive rights in the NCSU licenses are expected to expire in 2036.

Our worldwide sublicense from Anandia, a plant biotechnology company based in Vancouver, Canada, grants us exclusive rights in the United States and co-exclusive rights with Anandia everywhere else in the world (except not in Canada where Anandia retains exclusive rights) to certain patents and patent applications relating to certain genes in the hemp/cannabis plant that are required for the production of cannabinoids, the “active ingredients” in the cannabis plant. The Anandia sublicense continues through the life of the last-to-expire patent, which is expected to be in 2035.

If any of our license agreements or other intellectual property agreements are not effective at preventing others from competing with us and/or using our intellectual property, our business could be adversely affected.

Risks Related to Ownership of Our Common Stock

An active trading market for our common stock may not be sustained and you may not be able to resell your shares at or above the price at which you purchased them.

An active trading market for our shares may not be sustained. In the absence of an active trading market for our common stock, shares of common stock may not be able to be resold at or above the purchase price of such shares. Although there can be no assurances, we expect that our common stock will continue to be listed on the NASDAQ Capital Market (“NASDAQ”). However, even if our common stock continues to be listed on the NASDAQ, there is no assurance that an active market for our common stock will continue in the foreseeable future. There also can be no assurance that we can maintain such listing on the NASDAQ. If we are ever no longer listed on the NASDAQ or other national stock exchange in the future, then it would be more difficult to dispose of shares or to obtain accurate quotations as to the market value of our common stock compared to securities of companies whose shares are traded on national stock exchanges.

Our stock price may be highly volatile and could decline in value.

Our common stock is currently traded on the NASDAQ and the market price for our common stock has been volatile. Further, the market prices for securities in general have been highly volatile and may continue to be highly volatile in the future. The following factors, in addition to other risk factors described in this section, may have a significant impact on the market price of our common stock:

- general economic conditions, including adverse changes in the global financial markets;
- actual and anticipated fluctuations in our quarterly financial and operating results;
- developments or disputes concerning our intellectual property or other proprietary rights;
- introduction of technological innovations or new commercial products by us or our competitors;
- issues in manufacturing or distributing our products or potential products;
- market acceptance of our products or potential products;
- FDA or other United States or foreign regulatory actions affecting us or our industry;
- litigation or public concern about the safety of our products or potential products;
- negative press or publicity regarding us or our common stock;
- the announcement of litigation against us or the results of on-going litigation;
- additions or departures of key personnel;
- third-party sales of large blocks of our common stock or third party short-selling activity;
- third-party articles regarding us or our securities;
- pending or future shareholder litigation;
- sales of our common stock by our executive officers, directors, or significant stockholders; and
- equity sales by us of our common stock or securities convertible into common stock to fund our operations.

These and other external factors may cause the market price and demand for our common stock to fluctuate substantially, which may limit or prevent investors from readily selling their shares of common stock and may otherwise negatively affect the liquidity of our common stock. In addition, in the past, when the market price of a stock has been volatile, holders of that stock have instituted securities class action litigation against the company that issued the stock, such as the current class action and derivative lawsuits. Such lawsuits and any future related lawsuits could cause us to incur substantial costs defending the lawsuit and can also divert the time and attention of our management, which would have a negative adverse impact on our business. See the risk factor below entitled: *"We are named defendant in certain litigation matters, including federal securities class action lawsuits and derivative complaints; if we are unable to resolve these matters favorably, then our business, operating results and financial condition may be adversely affected."*

We are named defendant in certain litigation matters, including federal securities class action lawsuits and derivative complaints; if we are unable to resolve these matters favorably, then our business, operating results and financial condition may be adversely affected.

We are currently involved in certain litigation matters, including securities class action and derivative litigation. See "Item 3 – Legal Proceedings" included in this Annual Report on Form 10-K. We cannot at this time predict the outcome of these matters or any future litigations matters (whether related or unrelated) or reasonably determine the probability of a material adverse result or reasonably estimate range of potential exposure, if any, that these matters or any future matters might have on us, our business, our financial condition or our results of operations, although such effects, including the cost to defend, any judgements or indemnification obligations, among others, could be materially adverse to us. In addition, in the future, we may need to record litigation reserves with respect to these matters. Further,

regardless of how these matters proceed, it could divert our management's attention and other resources away from our business.

Future sales of our common stock will result in dilution to our common stockholders.

Sales of a substantial number of shares of our common stock in the public market may depress the prevailing market price for our common stock and could impair our ability to raise capital through the future sale of our equity securities. Additionally, if any of the holders of outstanding options or warrants exercise or convert those shares, as applicable, our common stockholders will incur dilution in their relative percentage ownership. The prospect of this possible dilution may also impact the price of our common stock.

We do not expect to declare any dividends on our common stock in the foreseeable future.

We have not paid cash dividends to date on our common stock. We currently intend to retain our future earnings, if any, to fund the development and growth of our business, and we do not anticipate paying any cash dividends on our common stock for the foreseeable future. Additionally, the terms of any future debt facilities may preclude us from paying dividends on the common stock. As a result, capital appreciation, if any, of our common stock could be the sole source of gain for the foreseeable future.

Anti-takeover provisions contained in our articles of incorporation and bylaws, as well as provisions of Nevada law, could impair a takeover attempt.

Our amended and restated articles of incorporation and bylaws currently contain provisions that, together with Nevada law, could have the effect of rendering more difficult or discouraging an acquisition deemed undesirable by our board of directors. Our corporate governance documents presently include the following provisions:

- providing for a "staggered" board of directors in which only one-third (1/3) of the directors can be elected in any year;
- authorizing blank check preferred stock, which could be issued with voting, liquidation, dividend, and other rights superior to our common stock; and
- limiting the liability of, and providing indemnifications to, our directors and officers.

These provisions, alone or together, could delay hostile takeovers and changes in control of our Company or changes in our management.

As a Nevada corporation, we also may become subject to the provisions of Nevada Revised Statutes Sections 78.378 through 78.3793, which prohibit an acquirer, under certain circumstances, from voting shares of a corporation's stock after crossing specific threshold ownership percentages, unless the acquirer obtains the approval of the stockholders of the issuer corporation. The first such threshold is the acquisition of at least one-fifth, but less than one-third of the outstanding voting power of the issuer. We may become subject to the above referenced Statutes if we have 200 or more stockholders of record, at least 100 of whom are residents of the State of Nevada and do business in the State of Nevada directly or through an affiliated corporation.

As a Nevada corporation, we are subject to the provisions of Nevada Revised Statutes Sections 78.411 through 78.444, which prohibit an "interested stockholder" from entering into a combination with the corporation, unless certain conditions are met. An "interested stockholder" is a person who, together with affiliates and associates, beneficially owns (or within the prior two years did own) 10 percent or more of the corporation's voting stock.

Any provision of our amended and restated articles of incorporation, our bylaws or Nevada law that has the effect of delaying or deterring a change in control of our Company could limit the opportunity for our stockholders to receive a premium for their shares of our common stock and could also affect the price that some investors are willing to pay for our common stock.

Item 1B Unresolved Staff Comments.

None.

Item 2. Properties.

Our principal executive office and headquarters is located in Buffalo, New York, a leased facility. As of December 31, 2022, we operated eight facilities primarily in the United States. Of these locations, the tobacco segment had one manufacturing facility, hemp/cannabis segment had three manufacturing or inventory storage facilities, one office space, and one owned farm. Additionally, we have one leased research and development laboratory. We believe the facilities we operate and their equipment are effectively utilized, well maintained, generally are in good condition, and will be able to accommodate our capacity needs to meet current and growing levels of demand. We continuously review our anticipated requirements for facilities and, on the basis of that review, may from time to time acquire additional facilities, expand or dispose of existing facilities.

Item 3. Legal Proceedings.

See Note 12 - Commitments and Contingencies – Litigation - to our consolidated financial statements included in this Annual Report for information concerning our on-going litigation. In addition to the lawsuits described in Note 12 to our consolidated financial statements, from time to time we may be involved in claims arising in the ordinary course of business. To our knowledge, other than the cases described in Note 12 to our consolidated financial statements, no material legal proceedings, governmental actions, investigations or claims are currently pending against us or involve us that, in the opinion of our management, could reasonably be expected to have a material adverse effect on our business and financial condition.

Item 4. Mine Safety Disclosures.

Not applicable

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Our common stock is listed on the Nasdaq Capital Market under the symbol "XXII." As of February 22, 2023, there were 183 holders of record of shares of our common stock.

Dividend Policy

We have not previously and do not plan to declare or pay any dividends on our common stock. Our current policy is to retain all funds and any earnings for use in the operation and expansion of our business. Payment of future dividends, if any, will be at the discretion of our board of directors after taking into account various factors, including current financial condition, operating results and current and anticipated cash needs.

Recent Sales of Unregistered Securities

None.

Issuer Purchases of Equity Securities

None.

Shares authorized for issuance under equity compensation plans

On May 20, 2021, the stockholders of 22nd Century Group, Inc. (the "Company") approved the 22nd Century Group, Inc. 2021 Omnibus Incentive Plan (the "Plan"). The Plan allows for the granting of equity awards to eligible individuals over the life of the Plan, including the issuance of up to 5,000,000 shares of the Company's common stock and any remaining shares under the Company's 2014 Omnibus Incentive Plan pursuant to awards under the Plan. The Plan has a term of ten years and is administered by the Compensation Committee of the Company's Board of Directors to determine the various types of incentive awards that may be granted to recipients under the Plan and the number of shares of common stock to underlie each such award under the Plan. As of December 31, 2022, we had available 4,461,984 shares remaining for future awards under the Plan.

The following table summarizes the number of shares of common stock to be issued upon exercise of outstanding options and vesting of restricted stock units under the Plan and our prior 2010 and 2014 Equity Incentive Plans, the weighted-average exercise price of such stock options, and the number of securities available to be issued under the Plan as of December 31, 2022:

	Number of securities to be issued upon exercise of outstanding options, and restricted stock units (a)	Weighted average exercise price of outstanding options (b)	Number of securities remaining available for issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders	8,945,064 (1)	$ 1.86	4,461,984
Equity compensation plans not approved by security holders	—	N/A	—
Total	8,945,064	—	4,461,984 (2)

(1) Consists of outstanding options of 4,912,105 and unvested restricted stock units of 4,032,959.

(2) Consists of shares available for award under the Plan.

Item 6. [Reserved]

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

This discussion should be read in conjunction with the other sections of this Form 10-K, including "Risk Factors," and the Financial Statements and notes thereto. The various sections of this discussion contain a number of forward-looking statements, all of which are based on our current expectations and could be affected by the uncertainties and risk factors described throughout this Annual Report on Form 10-K. See "Cautionary Note Regarding Forward-Looking Statements and Risk Factor Summary." Our actual results may differ materially. For purposes of this Management's Discussion and Analysis of Financial Condition and Results of Operations, references to the "Company," "we," us" or "our" refer to the operations of 22nd Century Group, Inc. and its direct and indirect subsidiaries for the periods described herein.

($ in thousands, except per share data or unless otherwise specified)

Executive Overview

- Executive overview
- Recent business acquisitions
- Tobacco business highlights
- Hemp/cannabis business highlights
- Corporate business highlights
- Financial overview

Our Financial Results

- Fiscal 2022 compared with fiscal 2021
- Liquidity and capital resources
- Impact of recently issued accounting standards

Critical Accounting Estimates

- Inventories
- Valuation of long-lived assets
- Business combinations

Executive Overview

- On December 23, 2021, the FDA granted MRTP authorization for our reduced nicotine cigarettes, VLN® King and VLN® Menthol King. In addition to authorizing the Company to market VLN® cigarettes with the claim, "95% less nicotine", to clarify the purpose of the brand, the FDA also authorized the claim, "Helps You Smoke Less."
- Commenced pilot market sales in Chicago during the first quarter of 2022 of VLN® King and VLN® Menthol King 95% reduced nicotine content cigarettes, the first and only FDA authorized MRTP designated combustible cigarettes.
- Based on strong pilot outcomes, announced plans for the expansion of VLN® into additional Illinois locations and the Colorado market as of September 2022. The Company also announced that it will launch VLN® in three additional states – Arizona, New Mexico, and Utah – covering the Four Corners region.
- Contracted the largest VLN® tobacco planting in 2022 to support expansion in both the U.S. and international markets.
- Announced an industry-first breakthrough in hemp/cannabis plant transformation with our partner KeyGene, expanding the Company's capabilities in modifying the principal genes controlling cannabinoid biosynthesis in the plant.

Recent Business Acquisitions and Other Events

- On May 13, 2022, we completed the acquisition of GVB Biopharma ("GVB"), a privately held contract development and manufacturing organization (CDMO). We believe GVB is one of the largest providers of hemp-derived active ingredients for the pharmaceutical and consumer goods industries worldwide based on total tonnage. GVB has industry leading market positions and expertise in all facets of the hemp/cannabis industry, including: research and genetics, proprietary cryogenic hemp extraction; refining, conversion, and product formulation technology; lead supplier of Active Pharmaceutical Ingredients (API); low-cost, scalable manufacturing capabilities; regulatory and compliance expertise; industry trusted high-quality products; and international capabilities

- On November 20, 2022, a fire occurred at the GVB Biopharma distillate and isolate manufacturing facility located in Grass Valley, OR. There were no reported life-threatening injuries, but the fire damaged the refinement facility requiring all hemp refining operations on site to be curtailed. Additional equipment and inventory stored in adjacent buildings was not damaged and was relocated to nearby facilities as part of the Company's business continuity plans. The Company subsequently commenced the insurance claims process and believes that losses resulting from the fire will be covered by its property and business interruption policies. Subsequent to the fire, the Company implemented backup sourcing and production plans to continue fulfilling customer orders and to resume production of distillate and isolate ingredients.

- On January 19, 2023, we acquired RX Pharmatech Ltd ("RXP"), a privately held leading United Kingdom distributor of cannabinoids with 1,276 novel food applications with the U.K. Food Standards Agency ("FSA"). RXP's products include CBD isolate and numerous variations of finished products like gummies, oils, drops, candies, tinctures, sprays, capsules and others. The U.K. is not accepting new novel food applications for cannabinoid products at this time and denied tens of thousands of product applications earlier in 2022 during the FSA's first round of screening. Accordingly, we believe this market dynamic could allow us to open new opportunities to land highly accretive contracts with multinationals for quality CBD and hemp-derived consumer products dependent on the novel food licenses.

Refer to Note 2 "Business Acquisitions" and Note 21 "Subsequent Events" of the Notes to Consolidated Financial Statements contained in Item 8 of this report for additional information about the acquisition of GVB and RXP.

Tobacco Business Highlights

- Leveraged the exceptional Chicago pilot results to expand VLN® sales in Illinois and launch in Colorado, where the state employs a favorable MRTP excise tax program. Announced additional launch plans in Arizona, New Mexico and Utah.
- Commenced an aggressive multi-state VLN® rollout strategy, targeting up 18 states by year-end 2023, aimed at penetrating geographies and markets with large adult smoker populations, including those with favorable MRTP state excise tax savings, which can be used toward consumer incentives, distribution support, and additional programming to raise awareness of VLN® products.
- Initiated agreements with national-scale C-store distribution partners, including Core-Mark/Eby-Brown and others pending, to facilitate state-wide or multi-state launches of VLN® at hundreds of stores within our target markets in an accelerated timeline.
- Announced expansion into Texas, California and Florida, expected in conjunction with the largest multi-state U.S. C-store chain leveraging these new national scale distribution capabilities.
- Secured additional retail point of sale placements with regional C-stores, such as Texas based CEFCO, and new regional distribution agreements with Hub, Inc., serving regional Midwestern and tribal accounts, and Chambers & Owen, Inc., serving the upper Midwest.
- Gained authorization to test VLN® sales at four United States military bases located in California, Arizona and North Carolina, beginning in the second quarter.
- Poised to benefit from federal, state and international regulatory appetite for banning menthol and mandating reduced nicotine content. The Company has the only FDA-authorized combustible cigarette able to meet the stringent reduced nicotine content product standard under the FDA's Comprehensive Plan requiring that all cigarettes be made "minimally or non-addictive."
    - Proposed FDA menthol cigarette ban, in final rules status, could leave VLN® Menthol King as the only combustible menthol cigarette on the market, providing a critical off-ramp to help current menthol smokers to smoke less, a final decision expected in August 2023.
    - In December 2022, New Zealand became the first country to pass a nationwide mandate permitting only reduced nicotine content cigarettes to be sold starting in early 2025.
- Planted the largest ever VLN® tobacco crop in 2022, including the second-generation VLN® 2.0 reduced nicotine tobacco plants, which have demonstrated approximately 30% higher yields, enhanced quality leaf, improved disease resistance, reduction in nutrient requirements and increased stability across various environments and geographies.
    - Announced a dedicated seed cultivation program designed to generate enough tobacco to support the entire New Zealand cigarette marketplace with reduced nicotine content tobacco, more than 2 billion sticks annually.
- Completed expansion of existing manufacturing operations and increased capacity by 25%, including installation of a new production line and initiation of a second shift.

Hemp/Cannabis Business Highlights

- Fundamentally shifted hemp/cannabis business, moving from primarily research and development efforts to a fully commercialized company with the acquisition of GVB Biopharma, a global scale provider of hemp-derived cannabinoid ingredients and API to the pharmaceutical and consumer goods industries with world-class CDMO capabilities.
- Positioned for global leadership as the largest provider of cannabinoid extracts and isolates in North America, focused on cannabidiol (CBD) and cannabigerol (CBG) extracted and refined at industrial scale into distillates.
- Completed vertical integration of novel cannabinoid value chain from receptor science to finished goods and now CDMO+D capabilities for complete category management to retail points of sale.
- Advancing multiple verticalized license agreements with major consumer CBD and alternative cannabinoid brands to manufacture and distribute key cannabinoid product offerings to retailers throughout the U.S. as a new turnkey solution for consumer facing cannabis product brands.
- Continued expanding CBD crude production capabilities with new Prineville, Oregon facility, one of the largest hemp extraction plants in the world, with expected capacity exceeding 15,000 kg/month at full operation, further improving gross margin on all GVB cannabinoid products.
- Responded to a fire at the Company's Grass Valley manufacturing facility, immediately shifting to alternate supply sources to fulfill all customer deliveries planned in the fourth quarter. New facilities are being established, replacing the prior capacity, as the Company plans for construction of a new, larger and more efficient distillate and isolate manufacturing campus.
- Submitted DMF to the FDA to produce and supply APIs for the medical and pharmaceutical industries while also pursuing The International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH) Q7 international pharma-grade audit standard certification in order to supply naturally derived hemp/cannabis APIs.
- Announced a global sales, marketing and distribution agreement with Cannabinoid API Solutions (CAS) and Transo-Pharm for APIs to accelerate opportunities to supply to the largest and most innovative pharmaceutical and consumer goods manufacturers.
- Acquired RX Pharmatech Ltd. in an accretive transaction securing a portfolio of 1,276 CBD product and ingredient based Novel Food Applications with the U.K. Food Standards Agency, accelerating CBD product growth in the U.K. and EU food and nutraceuticals markets.
- Announced the Company's central distribution facility in the Netherlands, opened in November 2022, will support growing demand for hemp/cannabis products in Europe, the Middle East, and Africa (EMEA).

Corporate Business Highlights

- Dr. Calvin Treat joined the Company as our Chief Scientific Officer on May 23, 2022, further enhancing our deep expertise in plant-based biotechnology across all three of our plant franchises. Dr. Treat has led global plant biotechnology programs at Bayer and Monsanto, including corn, soybean, and cotton crop improvement technologies.
- R. Hugh Kinsman was appointed Chief Financial Officer on June 16, 2022, expanding his role at GVB Biopharma to include corporate financial leadership functions.
- The Company announced that the position of President and Chief Operating Officer was eliminated effective September 30, 2022. James A. Mish, assumed the responsibilities of Corporate President, and operations have been integrated into the tobacco and hemp/cannabis business teams.
- Lucie S. Salhany was appointed to the Company's Board of Directors in September 2022, extending her experience in positioning unique products for successful launch, corporate strategy, and entrepreneurial ventures to help raise 22nd Century's profile in tobacco harm reduction and the hemp/cannabis industry.
- The Company announced that John Miller was appointed as an executive officer and President of Tobacco effective November 11, 2022. John J. Miller initially joined our tobacco business in May 2022, to help achieve the full potential of our tobacco franchise. Mr. Miller was the President and CEO of Swisher International, Inc., the largest manufacturer and exporter of cigars and smokeless tobacco products in America.

Financial Overview – Fourth Quarter and Full Year 2022 Results

- Net revenues for the fourth quarter of 2022 were $19,206, an increase of 141.3% from $7,960 in 2021.
    - Revenue from tobacco-related products was $9,951, an increase of 25.7% from 2021, primarily driven by volume increases in contract manufacturing and initial VLN® sales as part of the early rollout in Illinois and Colorado.
        - Fourth quarter 2022 cartons sold of 1,354 compared to 1,144 in the comparable prior year period.
    - Revenue from hemp/cannabis-related products was $9,255, compared to $43 in the prior year fourth quarter, reflecting the acquisition of GVB.
- Net revenues for the full year 2022 were $62,111, an increase of 100.7% from $30,948 in 2021.
- Gross profit for the fourth quarter of 2022 was a loss of $646 compared to profit of $231 in the prior year period.
    - Gross profit from tobacco-related products was $(44), a decrease of $400 compared to the prior year period, reflecting lower margin sales mix in contract manufacturing products.
    - Gross profit from hemp/cannabis-related products was a loss of $(601) compared to $(125) in the prior year. Margin declines in the fourth quarter were primarily due to impact of the Grass Valley fire. On a proforma basis, as if the GVB acquisition had occurred effective January 1, 2021, gross profit would have been $1,594 in the fourth quarter 2021.
- Gross profit for the full year 2022 was $1,174, a decrease of 21.0% from 2021.
- Total operating expenses for the fourth quarter 2022 increased to $22,512 compared to $9,262 in the prior year quarter driven by:
    - Sales, general and administrative expenses increased to $14,097 driven primarily by the acquisition of GVB, higher strategic consulting and marketing, legal, and personnel costs to expand the launch of VLN®
    - Research and development expenses increased to $2,093, driven by personnel expenses and costs associated with the Company's hemp/cannabis and hops research programs.
    - Other operating expenses, net was $6,322 reflecting the unusual and infrequent charges recorded in connection with the Grass Valley fire in November 2022.
- Operating loss for the fourth quarter 2022 was $23,158, compared to a loss of $9,031 in the prior year period. Operating loss for the full year 2022 was $57,106, compared to a loss of $28,412 in the prior year.
- Net loss in the fourth quarter of 2022 was $26,283, representing a net loss per share of $0.12 compared with net loss in the fourth quarter of 2021 of $13,964, representing a net loss per share of $.09. Net loss for the full year 2022 was $59,801, representing a net loss per share of $0.31 compared with net loss for the full year 2021 of $32,609, representing a net loss per share of $.21.
- As of December 31, 2022, we had $21,213 in cash, cash equivalents and short-term investments securities.
    - During the first quarter of 2023, the Company received $5,000 of casualty loss insurance recoveries from the Grass Valley fire with business interruption insurance claims proceeds expected thereafter.
    - On March 3, 2023, the Company announced a $21,052 senior credit facility to fund increased working capital needs related to the significant consumer demand for its VLN® product and GVB business lines.
        - The new three-year credit facility was issued at 5% original issuance discount (OID), will bear cash interest at a rate of 7% per annum, and commence principal amortization in the

second year at a rate of 2% of the original balance per month. The Company has the option to redeem the facility early starting in the second year.

- The Company's strengthened balance sheet supports growing working capital needs driven by increased VLN® product shipments to multiple national-scale distribution partners as well as strong customer demand for hemp/cannabis bulk ingredients.
- 22nd Century's operating cash requirements are anticipated to decrease through fiscal 2023, reflecting higher sales volume of higher margin contract manufacturing operations (CMO) cigarettes and VLN® products, as well as continued organic growth of GVB's operations.

Our Financial Results

The following table presents selected financial information derived from our Consolidated Financial Statements, contained in Item 8 of this report, for the periods presented (dollars in thousands, except per share amounts):

	Year Ended		Change	
	December 31 2022	December 31 2021	$	%
Tobacco revenues, net	$ 40,501	$ 30,905	$ 9,596	31.0
Hemp/cannabis revenues, net	21,610	43	21,567	NM
Total revenues, net	62,111	30,948	31,163	100.7
Cost of goods sold	60,937	29,462	31,475	106.8
Gross profit	1,174	1,486	(312)	(21.0)
Gross profit as a % of revenues, net	1.9 %	4.8 %		
Operating expenses:				
Sales, general and administrative ("SG&A")	44,517	25,908	18,609	71.8
SG&A as a % of revenues, net	71.7 %	41.7 %		
Research and development ("R&D")	6,561	3,912	2,649	67.7
R&D as a % of revenues, net	10.6 %	6.3 %		
Other operating expenses, net ("OOE")	7,202	78	7,124	9,170.4
Total operating expenses	58,280	29,898	28,382	94.9
Operating loss	(57,106)	(28,412)	(28,694)	101.0
Operating loss as a % of revenues, net	(91.9)%	(45.7)%		
Other income (expense):				
Unrealized loss on investment	(5)	(6,994)	6,989	(99.9)
Realized (loss) gain on Panacea investment	(2,789)	2,548	(5,337)	(209.5)
Realized loss on short-term investment securities	(366)	-	(366)	NM
Other income, net	71	-	71	NM
Interest income, net	313	321	(8)	(2.5)
Interest expense	(353)	(58)	(295)	503.9
Total other expense	(3,129)	(4,183)	1,054	(25.2)
Loss before income taxes	(60,235)	(32,595)	(27,640)	84.8
(Benefit) provision for income taxes	(434)	14	(448)	(3,196.5)
Net loss	$ (59,801)	$ (32,609)	(27,192)	83.4
Net loss as a % of revenues, net	(96.3)%	(52.5)%		
Net loss per common share (basic and diluted)	$ (0.31)	$ (0.21)	(0.10)	48.6

NM - calculated change not meaningful

Refer to Note 17, "Segment and Geographic Information," of the Notes to Consolidated Financial Statements contained in Item 8 of this report for additional information regarding operating results for our two operating and reportable segments: (1) Tobacco, (2) Hemp/cannabis.

Fiscal 2022 Compared with Fiscal 2021

Revenue - Sale of products, net

	Year Ended December 31 2022	Year Ended December 31 2021	Change $	Change %
Tobacco	$ 40,501	$ 30,905	$ 9,596	31.0
Hemp/cannabis	21,610	43	21,567	NM
Total revenues, net	$ 62,111	$ 30,948	31,163	100.7

The increase in revenue for the year ended December 31, 2022, compared to the year ended December 31, 2021, was primarily the result of an increase in tobacco revenue of $9,596 or 31.0% from 2021 primarily driven by volume increases in the number of cartons sold. Full year 2022 cartons sold were of 5,782 compared to 4,331 in the comparable prior year period.

Hemp/cannabis revenue was $21,567 in the current year compared to negligible revenues in 2021, primarily as a result of the GVB acquisition.

Gross profit

	Year Ended December 31 2022	Year Ended December 31 2021	Change $
Gross profit	$ 1,174	$ 1,486	(312)
Percent of Revenues, net	1.9 %	4.8 %	

The decrease in gross profit and gross profit as a percent of revenues, net for the year ended December 31, 2022, compared to the year ended December 31, 2021, was primarily driven by an increase of $218 from favorable tobacco volume offset by losses from hemp/cannabis of $530. Hemp/cannabis gross profit was unfavorable mainly due to non-recurring charges of $1,259, primarily attributable to amortization of inventory step-up resulting from the acquisition of GVB. Additionally, hemp/cannabis gross profits in the fourth quarter were negatively impacted from the Grass Valley fire. We anticipate subsequent recoveries in 2023 of gross profit negatively impacted by the fire through our business interruption insurance claims.

Sales, general and administrative expense

	Change 2022 vs 2021 $	Change 2022 vs 2021 %
Compensation and benefits (a)	$ 2,922	24.9
Legal (b)	497	48.7
Strategic consulting (c)	4,994	63.9
Sales and marketing (d)	1,305	412.9
Other (e)	1,099	22.0
GVB (f)	7,793	100.0
Net increase in SG&A expenses	$ 18,609	71.8

(a) Increases in compensation and benefits primarily due to $716 increased headcount mainly due to the increase in selling and marketing personnel driven by the ongoing expansion and accelerated launch of VLN®, $1,486 increase in equity comp ($1,237 related to accelerated vesting of an employee's outstanding equity awards as part of the termination severance agreement), and an increase of $615 in severance.

(b) Increased legal expenses due to regulatory compliance for VLN® launch, and enforcement of our patent portfolios.

(c) Increase of strategic consulting due to additional business development, recruitment, and investor relations expenses.

(d) Increases due to the ongoing expansion and accelerated launch of VLN®.

(e) Other expenses increased due to $529 of travel and entertainment, $239 of technology expenses, $215 in public accounting fees, and other $335 offset by a decrease in insurance expenses of $219.

(f) Increased SG&A as a result of the acquisition of GVB on May 13, 2022, including corporate personnel costs and general overhead.

Research and development expense

	Change 2022 vs 2021 $	Change 2022 vs 2021 %
Compensation and benefits (a)	$ 438	72.3
Contract costs (b)	1,250	56.9
Consulting and professional services (c)	526	630.7
Other (d)	325	31.7
GVB (e)	110	100.0
Net increase in R&D expenses	$ 2,649	791.6

(a) Increased compensation and benefits related to the additional executive and R&D personnel in the current year.

(b) Increased expenses due to our contracts related to field trials, hemp/cannabis programs, new hops R&D and royalty fees.

(c) Increased consulting to evaluate strategic opportunities related to our tobacco patent portfolio.

(d) Other increases include facilities expenses from our new Maryland lab, amortization expenses of new patents, increased patent maintenance costs and testing costs.

(e) Increased R&D as a result of the acquisition of GVB on May 13, 2022.

Other operating expenses, net

	Year Ended December 31,	
	2022	**2021**
Grass Valley fire:		
Fixed asset write-offs	$ 5,550	$ -
Inventory charges	3,998	-
Compensation & benefits	195	-
Professional services	36	-
Lease obligations	20	-
Insurance recoveries	(5,000)	-
Total Grass Valley fire (a)	4,799	-
Acquisition costs (b)	1,046	-
Impairment of intangible assets (c)	1,488	78
Impairment of inventory (c)	237	-
(Gain) loss on sale or disposal of property, plant and equipment (d)	(368)	-
Total other operating expenses, net	$ 7,202	$ 78

(a) In November 2022, there was a fire at our Grass Valley manufacturing facility in Oregon, which manufactures bulk ingredients, primarily CBD isolate and distillate. The total charges of $9,799 were offset by $5,000 of insurance proceeds.

(b) Acquisition costs attributable to the acquisition of GVB on May 13, 2022.

(c) Other general charges include impairment of intangible assets that no longer meet the Company's strategic objectives and inventory impairment as a result of unavoidable casualty from a weather event.

(d) Reflects gain on sale resulting from sale of older tobacco manufacturing equipment.

Refer to Note 19, "Other operating expenses, net," of the Notes to Consolidated Financial Statements contained in Item 8 of this report for additional information regarding these charges.

Other income (expense)

	Year Ended		Change	
	December 31 2022	**December 31 2021**	**$**	**%**
Other income (expense):				
Unrealized loss on investment (a)	$ (5)	$ (6,994)	$ 6,989	(99.9)
Realized (loss) gain on Panacea investment (b)	(2,789)	2,548	(5,337)	(209.5)
Realized loss on short-term investment securities	(366)	-	(366)	NM
Other income, net	71	-	71	NM
Interest income, net	313	321	(8)	(2.5)
Interest expense (c)	(353)	(58)	(295)	503.9
Total other expense	$ (3,129)	$ (4,183)	$ 1,054	(25.2)

NM - calculated change not meaningful

(a) Unrealized loss on investment includes fair value adjustments for our investment in Panacea Life Sciences Holdings, Inc. ("PLSH") during the year ended December 31, 2021 and Aurora Cannabis Inc ("Aurora") stock warrants during the years ended December 31, 2022 and 2021, respectively.

(b) Realized (loss) gain on PLSH investment reflects the change in fair value and write-off of our investment in PLSH common stock during the year ended December 31, 2022 of $2,340 and extinguishment of note receivable of $500 less adjusted discount of $51.

(c) Interest expense increased in 2022, as compared to the prior year period, primarily due to the interest recognized from the GVB bridge notes resulting from the GVB acquisition.

Liquidity and Capital Resources

	December 31 2022	December 31, 2021
Cash and cash equivalents	$ 3,020	$ 1,336
Short-term investment securities	$ 18,193	$ 47,400
Working capital	$ 31,587	$ 45,958

Cash, cash equivalents and short-term investment securities decreased by $27,523 primarily as a result of cash used in operating activities, offset by net proceeds from issuance of common stock in July 2022 described below.

Working Capital

As of December 31, 2022, we had working capital of approximately $31,587 compared to working capital of approximately $45,958 as of December 31, 2021, a decrease of $14,371. This decrease in working capital was primarily due to increases from normal fluctuations of current assets such as inventory (i.e. tobacco leaf grow) and an increase of $11,897 attributable to GVB, offset by a decrease of $27,523 in cash, cash equivalents and short-term investment securities.

Summary of Cash Flow

	Year Ended December 31,	
	2022	2021
Cash provided by (used in):		
Operating activities	$ (51,714)	$ (22,839)
Investing activities	22,578	(27,729)
Financing activities	30,820	50,875
Net change in cash and cash equivalents	$ 1,684	$ 307

Net cash used in operating activities

Cash used in operations increased $28,875 from $22,839 in 2021 to $51,714 in 2022. The primary driver for this increase was higher net loss of $27,192, driven by increased spending in SG&A and R&D both from the acquisition of GVB and acceleration of the launch of VLN®, an increase of $9,154 related to net adjustments to reconcile net loss to cash, and an increase in cash used for working capital components related to operations in the amount of $10,837 for the year ended December 31, 2022, as compared to the year ended December 31, 2021.

Net cash provided by (used in) investing activities

Cash provided by investing activities amounted to $22,578 in 2022 as compared to cash used in investing activities of $27,729 in 2021. The decrease in cash used in investing activities of $50,307 was primarily the result of a net increase in the net cash provided by our short-term investments in the amount of $55,235 offset by an increase in the cash used for acquisition of property, plant and equipment, the acquisition of patents, trademarks and licenses, acquisition of GVB and investment in Change Agronomy Ltd. in the amount of $3,358 for the year ended December 31, 2022 compared to the year ended December 31, 2021.

Net cash provided by financing activities

During the year ended December 31, 2022, cash provided by financing activities decreased by $20,055 resulting from (i) the net proceeds of $11,782 resulting from cash exercises of all outstanding warrants in 2021 that did not occur in 2022; (ii) the change in net proceeds of issuance of common stock of $5,722; (iii) the change in net proceeds pertaining to notes payable issuances and payments of $1,709; (iv) change in net proceeds from stock option exercises of $1,133. These decreases were partially offset by the change in cash paid for taxes related to settlement of restricted stock units of $320.

Cash demands on operations

Our principal sources of liquidity are our cash and cash equivalents, short-term investment securities, cash generated from our tobacco contract manufacturing business and hemp/cannabis business and proceeds from debt and equity financing activities. As of December 31, 2022, we had approximately $21,213 of cash and cash equivalents and short-term investments, and $5,000 insurance recovery receivable related to the Grass Valley fire, which we anticipate collecting in the first half of 2023. We have additional business interruption coverage with policy limits of up to $15,000, which we continue pursuing in connection with such incident.

As described below, on July 25, 2022, we completed a $35,000 above-market registered direct offering with institutional investors generating net proceeds of $32,484, and on March 3, 2023 we entered into a $21,052 senior secured credit facility generating net proceeds to us of approximately $20,000. Proceeds from these financing activities are intended to be used to continue with the launch of our VLN® products and to meet increased GVB customer demands and volume.

Our cash, cash equivalents, short-term investment securities, insurance recovery proceeds, and credit facility financing, as well as the sustained tobacco contract manufacturing and hemp/cannabis sales, will provide sufficient resources for estimated contractual commitments, described further in Note 12 to our Consolidated Financial Statements included herein, and normal cash requirements for operations well beyond the next twelve months. We are selectively deploying capital to accelerate the launch of VLN®, expand tobacco manufacturing operations, invest in GVB's production capacity and increase inventory levels to meet growing demand for both hemp/cannabis and tobacco products and for research and development. Our cash requirements in future periods are anticipated to decrease, reflecting higher sales volume for VLN® products through fiscal 2023 and continued organic growth of hemp/cannabis operations, providing adequate liquidity from the current balance sheet to complete our planned strategic initiatives.

New Senior Secured Credit Facility

On March 3, 2023, the Company entered into a Securities Purchase Agreement (the "Purchase Agreement") with each of the purchasers party thereto (each, including its successors and assigns, a "Purchaser" and collectively, the "Purchasers") and JGB Collateral, LLC, a Delaware limited liability company, as collateral agent for the Purchasers (the "Agent"). Pursuant to the Purchase Agreement, the Company agreed to sell to the Purchasers (i) 5% Original Issue Discount Senior Secured Debentures (the "Debentures") with an aggregate principal amount of $21,052,632 and (ii) warrants to purchase up to 5,000,000 shares of the Company's common stock, par value $0.00001 per share (the "Common Stock"), for an exercise price of $1.275 per share, a 50% premium to the VWAP on the closing date (the "JGB Warrants"), subject to adjustments as set forth in the JGB Warrants, for a total purchase price of $20,000,000.

The Debentures bear interest at a rate of 7% per annum, payable monthly in arrears as of the last trading day of each month and on the maturity date. The Debentures mature on March 3, 2026. At the Company's election, subject to certain conditions, interest can be paid in cash, shares of the Company's common stock, or a combination thereof. The Debentures are subject to an exit payment equal to 5% of the original principal amount, or $1,052,632, payable on the maturity date or the date the Debentures are paid in full (the "Exit Payment"). Any time after, March 3, 2024, the Company may irrevocably elect to redeem all of the then outstanding principal amount of the Debentures for cash in an amount equal to the entire outstanding principal balance, including accrued and unpaid interest, the Exit Payment and a prepayment premium in an amount equal to 3% of the outstanding principal balance as of the prepayment date (collectively, the "Prepayment Amount"). Upon the entry into a definitive agreement that would effect a change in control (as defined in the Debentures) of the Company, the Agent may require the Company to prepay the outstanding principal balance in an amount equal to the Prepayment Amount. Commencing on March 3, 2024, at its option, the holder of a Debenture may require the Company to redeem 2% of the original principal amount of the Debentures per calendar month which amount may at the Company's election, subject to certain exceptions, be paid in cash, shares of the Company's common stock, or a combination thereof.

The JGB Warrants are exercisable for five years from September 3, 2023, at an exercise price of $1.275 per share, a 50% premium to the VWAP on the closing date, subject, with certain exceptions, to adjustments in the event of stock splits, dividends, subsequent dilutive offerings and certain fundamental transactions, as more fully described in the JGB Warrant.

GVB Bridge Loan

On March 3, 2023, the Company executed a Subordinated Promissory Note (the "Subordinated Note") with a principal amount of $2,864,767 in favor of Omnia Ventures, LP ("Omnia"). The Subordinated Note refinanced the 12% Secured Promissory Note with a principal amount of $1,000,000 dated as of October 29, 2021 payable to Omnia (the "October Note") and the 12% Secured Promissory Note with a principal amount of $1,500,000 dated as of January 14, 2022 payable to Omnia (the "January Note", and together with the October Note, the "Original Notes"), which were assumed by the Company in connection with the acquisition of GVB Biopharma.

Under the terms of the Subordinated Note, the Company is obligated to make interest payments in-kind (the "PIK Interest"). The PIK Interest accrues at a rate of 26.5% per annum, payable monthly. The Company is not permitted to prepay all or any portion of the outstanding balance on the Subordinated Note prior to maturity. The maturity date of the Subordinated Note is May 1, 2024.

July 2022 Equity Raise

On July 25, 2022, we completed a capital raise through a registered direct offering and issued 17,073 shares of common stock for net cash proceeds of $32,484. This excludes the proceeds, if any, from the exercise of the 17,073 warrants sold in the private placement that occurred concurrently with this offering.

Impact of Recently Issued Accounting Standards

In the normal course of business, we evaluate all new accounting pronouncements issued by the Financial Accounting Standards Board ("FASB"), SEC, or other authoritative accounting bodies to determine the potential impact they may have on our Consolidated Financial Statements. Refer to Note 1 "Summary of Significant Accounting Policies" of the Notes to Consolidated Financial Statements contained in Item 8 of this report for additional information about these recently issued accounting standards and their potential impact on our financial condition or results of operations.

Critical Accounting Estimates

Management's discussion and analysis of financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with GAAP. We make estimates and assumptions in the preparation of our consolidated financial statements that affect the reported amounts of assets and liabilities, revenue and expenses and related disclosures of contingent assets and liabilities. We base our estimates and judgments upon historical experience and other factors that are believed to be reasonable under the circumstances. Changes in estimates or assumptions could result in a material adjustment to the consolidated financial statements.

We have identified several critical accounting estimates. An accounting estimate is considered critical if both: (a) the nature of the estimates or assumptions is material due to the levels of subjectivity and judgment involved, and (b) the impact of changes in the estimates and assumptions have had or are reasonably likely to have a material effect on the consolidated financial statements. This listing is not a comprehensive list of all of our accounting policies. For further information regarding the application of these and other accounting policies, see Note 1 "Summary of Significant Accounting Policies" of the Notes to Consolidated Financial Statements contained in Item 8 of this report.

Inventories

Inventories are measured on a first-in, first-out basis at the lower of cost or net realizable value. Net realizable value is the estimated selling prices in the ordinary course of business, less reasonably predictable costs of completion, disposal, and transportation. The valuation of inventory requires us to estimate obsolete or excess inventory, as well as inventory that is not of saleable quality.

Historically, our adjustments or write-off charges recorded against inventory have been adequate to cover our losses. However, variations in methods or assumptions or volatility in spot pricing for hemp/cannabis could have a material impact on our results. Additionally, if our demand forecasts for specific products is greater than actual demand and we fail to reduce manufacturing output accordingly, we could be required to record additional inventory write-down or expense a greater amount of overhead costs, which would negatively impact our gross profit and net income.

Valuation of Long-Lived Assets

We make assumptions in establishing the carrying value, fair value and, if applicable, the estimated lives of our intangible and other long-lived assets. Goodwill and intangible assets determined to have an indefinite useful life are not amortized. Instead, these assets are evaluated for impairment on an annual basis on December 1, the measurement date, and whenever events or business conditions change that could indicate that the asset is impaired. Long-lived assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset (asset group) may not be recoverable.

Evaluation of goodwill for impairment

We test each reporting unit's goodwill for impairment on the measurement date and between annual tests if an event occurs or circumstances change that would more-likely-than-not reduce the fair value of a reporting unit below its carrying value. In conducting this annual impairment testing, we may first perform a qualitative assessment of whether it is more-likely-than-not that a reporting unit's fair value is less than its carrying value. A qualitative assessment requires that the Company consider events or circumstances including, but not limited to, macro-economic conditions, market and industry conditions, cost factors, competitive environment, changes in strategy, changes in customers, changes in the Company's stock price, results of the last impairment test, and the operational stability and the overall financial performance of the reporting units. If not, no further goodwill impairment testing is required. If it is more-likely-than-not that a reporting unit's fair value is less than its carrying value, or if we elect not to perform a qualitative assessment of a reporting unit, a quantitative analysis is performed, in which the fair value of the reporting unit is compared to its carrying value. To determine the fair values, the Company uses a weighted combination of the market approach based on comparable publicly traded companies and the income approach based on estimated discounted future cash flows. The

cash flow assumptions consider historical and forecasted revenue, operating costs and other relevant factors. If the carrying value of a reporting unit exceeds its fair value, an impairment loss is recognized equal to the excess, limited to the amount of goodwill allocated to that reporting unit.

We completed our annual goodwill impairment test as of December 1, 2022, and determined, after performing a quantitative assessment of the Hemp/cannabis reporting unit, the fair value of the Hemp/cannabis reporting unit exceeded its carrying amount. Resulting from the quantitative analysis, the fair value exceeded the carrying value of the Hemp/cannabis reporting unit by approximately 25%. We do not believe that any of our reporting units are at risk for impairment. However, changes to the factors considered above could affect the estimated fair value of one or more of our reporting units and could result in a goodwill impairment charge in a future period. We may be unaware of one or more significant factors that, if we had been aware of, would cause our conclusion to change, which could result in a goodwill impairment charge in a future period.

Evaluation of indefinite-lived intangible assets for impairment

Our indefinite-lived intangible assets include the certain trademarks and tradename and licenses. Similar to goodwill, we perform an annual impairment review of our indefinite-lived intangible assets on the last day of our fiscal year, unless events occur that trigger the need for an interim impairment review. We have the option to first assess qualitative factors in determining whether it is more-likely-than-not that an indefinite-lived intangible asset is impaired. If we elect not to use this option, or we determine that it is more-likely-than-not that the asset is impaired, we perform a quantitative assessment that requires us to estimate the fair value of each indefinite-lived intangible asset and compare that amount to its carrying value. Fair value is estimated using the relief-from-royalty method. Significant assumptions inherent in this methodology include estimates of royalty rates and discount rates. The discount rate applied is based on the risk inherent in the respective intangible assets and royalty rates are based on the rates at which comparable tradenames are being licensed in the marketplace. Impairment, if any, is based on the excess of the carrying value over the fair value of these assets.

For our indefinite-lived intangible assets—MSA, cigarette brand predicate and trademarks—we performed a qualitative evaluation and considered factors such as current and future sales projections, strategic objectives, future market and economic conditions, competition, and federal and state regulations. We determined it is more likely than not that that the assets are not impaired.

For our indefinite-lived intangible asset relate to the GVB tradename, we performed a quantitative assessment to test the asset for impairment as of December 1, 2022. The fair value was determined by utilizing the relief from royalty method with valuation assumptions consisting of royalty rate of 1.0% and discount rate of 24.5%. The estimated fair value was concluded to be below carrying value and as a result an impairment charge of $1,453 was recorded.

We do not believe that our indefinite-lived intangible assets are at risk for further impairment. However, a significant increase in the discount rate, decrease in the terminal growth rate, increase in tax rates, decrease in the royalty rate or substantial reductions in our revenue assumptions could have a negative impact on the estimated fair value of our tradename and require us to recognize additional impairment in a future period.

Evaluation of long-lived assets for impairment

When impairment indicators exist, we determine if the carrying value of the long-lived asset(s) or definite-lived intangible asset(s) including, but not limited to, PP&E and right-of-use lease assets, exceeds the related undiscounted future cash flows. In cases where the carrying value exceeds the undiscounted future cash flows, the carrying value is written down to fair value. Fair value is generally determined using a discounted cash flow analysis. When it is determined that the useful life of an asset (asset group) is shorter than the originally estimated life, and there are sufficient cash flows to support the carrying value of the asset (asset group), we accelerate the rate of depreciation/amortization in order to fully depreciate/amortize the asset over its shorter useful life.

Estimation of the cash flows and useful lives of long-lived assets and definite-lived intangible assets requires significant management judgment. Events could occur that would materially affect our estimates and assumptions. Unforeseen changes, such as the loss of one or more significant customers, technology obsolescence, or significant manufacturing disruption, among other factors, could substantially alter the assumptions regarding the ability to realize the return of our investment in long-lived assets, definite-lived intangible assets or their estimated useful lives.

Business Combinations

The Company accounts for business combinations in accordance with ASC Topic 805, *Business Combinations*. The fair value of the consideration paid is assigned to the underlying net assets of the acquired business based on the respective fair values of identifiable assets acquired and liabilities assumed on the date of acquisition. Any excess purchase price over the fair value of net assets acquired is recorded to goodwill. Determining the fair value of these items requires management's judgment and often also requires the use of independent valuation specialists. Fair value determinations and useful life estimates are based on, among other factors, estimates of expected future cash flows from revenues of the intangible assets acquired, estimates of appropriate discount rates used to present value expected future cash flows, estimated useful lives of the intangible assets acquired and other factors. The judgments made in the determination of the estimated fair values assigned to the assets acquired and the liabilities assumed, as well as the estimated useful life of certain assets and liabilities, can materially impact the financial statements in periods after acquisition, such as through depreciation and amortization expense. For more information see Note 2 "Business Combinations" of the Notes to Consolidated Financial Statements.

Management has discussed these critical accounting policies and estimates with the Audit Committee of the Company's Board of Directors. While our estimates and assumptions are based on our knowledge of current events and future actions, actual results may ultimately differ from these estimates and assumptions.

Off-Balance Sheet Arrangement

We do not have any off-balance sheet arrangements as defined by Item 303(a)(4) of Regulation S-K.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Not required for smaller reporting companies.

Item 8. Financial Statements and Supplementary Data.

The required financial statements and the notes thereto are contained in a separate section of this Form 10-K beginning with the page following Item 15 (Exhibits and Financial Statement Schedules) and are incorporated by reference into this Item 8.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our chief executive officer and chief financial officer, we conducted an evaluation of our disclosure controls and procedures, as such term is defined under Rule 13a-15(e) and 15d-15(e) promulgated under the Securities Exchange Act of 1934, as amended (the "Exchange Act"). Based on this evaluation, our chief executive officer and chief financial officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this Annual Report on Form 10-K to ensure information required to be disclosed in the reports filed or submitted under the Exchange Act is recorded, processed, summarized and reported, within the time period specified in the SEC's rules and forms. These

disclosure controls and procedures include controls and procedures designed to ensure that information required to be disclosed by us in the reports we file or submit is accumulated and communicated to management, including our chief executive officer and chief financial officer, as appropriate, to allow timely decisions regarding required disclosure.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Under the supervision and with the participation of our management, including our chief executive officer and chief financial officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in *Internal Control - Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on our evaluation under the framework in *Internal Control - Integrated Framework (2013)*, our management concluded that our internal control over financial reporting was effective as of December 31, 2022.

On May 13, 2022, we completed a purchase of substantially all of the assets of GVB's business dedicated to hemp-based cannabinoid extraction, refinement, contract manufacturing and product development (the "Transaction"). As the Transaction occurred in the middle of 2022, the scope of our evaluation of the effectiveness of internal control over financial reporting does not include GVB. This exclusion is in accordance with the SEC's general guidance that an assessment of a recently acquired business may be omitted from our scope for a period not to exceed one year from the date of the acquisition.

The financial results of GVB are included in our consolidated financial statements from the date of acquisition. The financial results of GVB constituted 19% of total assets, 35% of revenues, net and 25% of net loss of the consolidated financial statement amounts as of and for the year ended December 31, 2022. The Company is in the process of evaluating the existing controls and procedures of the acquired business and integrating the acquired business into its system of internal control over financial reporting. As a result, management was unable, without incurring unreasonable effort or expense, to conduct an assessment of internal control over financial reporting for the acquired business.

Our system of internal control over financial reporting was designed to provide reasonable assurance regarding the preparation and fair presentation of published financial statements in accordance with accounting principles generally accepted in the United States. All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance and may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

This Annual Report on Form 10-K does not include an attestation report of our independent registered public accounting firm regarding internal control over financial reporting due to a permanent exemption for smaller reporting companies.

Changes in Internal Controls over Financial Reporting

During the fourth quarter of 2022, we continued the process of evaluating the existing controls and procedures of GVB and integrating into its system of internal control over financial reporting.

Other than with respect to the integration of GVB, there was no change in our internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) during the quarter ended December 31, 2022 that has materially affected, or is reasonably likely to materially affect our internal control over financial reporting.

Item 9B. Other Information.

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspection

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

Officers and Directors

Set forth below is information regarding our directors, executive officers, and key personnel as of March 1, 2023:

Name	Age	Position
James A. Mish	59	Chief Executive Officer and Director
John Franzino	66	Chief Administrative Officer
John J. Miller	58	President, Tobacco Division
R. Hugh Kinsman	56	Chief Financial Officer
Peter Ferola	54	Chief Legal Officer
Dr. Michael Koganov	72	Director
Richard M. Sanders	69	Director
Nora B. Sullivan	65	Director
Clifford B. Fleet	52	Director
Roger D. O'Brien	74	Director
Anthony Johnson	47	Director
Lucille S. Salhany	76	Director

Directors:

James A. Mish, Chief Executive Officer. Mr. Mish has served as our Chief Executive Officer since June 22, 2020 and as a director since January 2022. He has an outstanding track record of delivering profitable growth at both privately-held and publicly-traded science-driven companies with a focus on pharmaceutical and consumer products commercialization. Prior to joining 22nd Century, he served as President and Chief Executive Officer of Purisys, a synthetic cannabinoid API, ingredients and solutions provider to pharmaceutical and consumer products companies, from 2019 to 2020 and Noramco, a global leader in the production of controlled substances for the pharmaceutical industry, from 2016 to 2019. There, Mr. Mish led the private equity carve out of Noramco from Johnson & Johnson/Janssen Pharmaceuticals and spearheaded the subsequent creation and spinoff of Purisys from Noramco. Mr. Mish began his career at Pfizer in research and development before holding positions of increasing responsibility at several companies including as President of Ashland Specialty Ingredients - Consumer Specialties, a major division of Ashland Corporation, a premier, global specialty materials company serving customers in a wide range of consumer and industrial markets from 2008 to 2016. Mr. Mish has a M.B.A. from The Wharton School of the University of Pennsylvania and a Bachelor of Science in Physics and Chemistry from Pennsylvania State University. Mr. Mish's strong leadership skills and pharmaceutical and consumer products experience led to our conclusion that he should serve as a director.

Clifford B. Fleet. Mr. Fleet has served as a director since his appointment on August 3, 2019 by the Board to fill a vacancy in the Class I director position resulting from the resignation of Henry Sicignano, III as of July 26, 2019. Mr. Fleet also served as the President and Chief Executive Officer of the Company from August 3, 2019 until December 13, 2019, at which time he resigned, effective on December 31, 2019. Mr. Fleet also served as a strategic advisor consultant to the Company from December 2018 to August 3, 2019. Mr. Fleet currently serves as the President and CEO of the Colonial Williamsburg Foundation, the world's largest living history museum and a national leader in American education. Prior to the Colonial Williamsburg Foundation, Mr. Fleet served as the President and CEO of 22nd Century Group. From 1995 to 2017 Mr. Fleet worked at Altria Group (NYSE: MO), serving in a variety of senior-level management positions in

Finance, Operations, Marketing, and Business Strategy and Development. From 2013 to 2017, Mr. Fleet served as the President and CEO of Philip Morris USA, Altria's largest subsidiary, when he ran Philip Morris USA, the nation's largest tobacco company, and John Middleton, a leading machine-made cigar manufacturer. During his tenure he led both organizations to business success in highly regulated environments. In addition, Mr. Fleet is an adjunct professor at the College of William & Mary teaching in the business school. Mr. Fleet holds a Bachelor of Arts, Master of Arts, Master of Business Administration and Juris Doctor from the College of William & Mary. Mr. Fleet's extensive experience in the tobacco industry led to our conclusion that he should serve as a director.

Anthony Johnson. Mr. Johnson has served as a director since August 2021 and is co-founder, President, and CEO of Kodikaz Therapeutic Solutions, a world-class next-generation non-viral gene therapy company since 2019. He is also a founding partner of Buffalo Biosciences in 2006, a life science strategic business management firm that supports the evaluation and commercialization of bioscience technologies from concept to market. Previously he was president and CEO of Empire Genomics, where he transformed a concept formed at a university lab into a preeminent oncology molecular testing enterprise, from 2006 - 2019. He also served as the business leader of the stem cell and regenerative medicine franchise for Thermo Fisher (Invitrogen Corporation). Mr. Johnson is an Aspen Institute Health Innovation Fellow and a member of the Aspen Global Leadership Network. He currently serves on the boards of several organizations including the WNED/PBS broadcasting service of Western New York. He has leveraged his business experience and board positions to mentor numerous technology startups and entrepreneurs, spur state and local job creation, and introduce STEM curriculum into early childhood education. Mr. Johnson is also a founding board member of the Communities of Giving Legacy Initiative, which works to create positive change in the lives of low-income youth of color via access to people, places, and experiences that help them achieve their life goals. Additionally, he serves as Michigan Street African-American Heritage Corridor Commissioner and was an Opportunities Council member for University of Buffalo. Formerly, he was a 15-year volunteer with the Big Brother Big Sister Foundation. Mr. Johnson holds an MBA from Manchester Business School, Manchester, UK, with an emphasis in international strategy, and a BA in biology from Fisk University, Nashville, TN. Mr. Johnson's experience commercializing bioscience technologies and life sciences experience led to our conclusion that he should serve as a director.

Michael Koganov. Dr. Koganov has served as a director since September 11, 2020. Dr. Koganov is recognized as a leading expert in the development of natural products using plant biotechnology and has achieved considerable accomplishments in physico-chemistry, biochemistry, bioelectrochemistry, and biotechnology. He is credited with developing Electro-Membrane technology for the comprehensive processing of plants to produce protein concentrates and secondary metabolites. Dr. Koganov co-founded Intellebio LLC, which developed the proprietary and sustainable Zeta Fraction™ technology that selectively isolates efficacious components from living plants and marine sources to produce a wide range of biofunctional ingredients. After the award-winning technology was acquired by AkzoNobel and then Ashland Global Holdings Inc., Dr. Koganov directed the research, product development, and commercialization of patented multifunctional bioactive Zeta Fractions that are used as key, signature ingredients in numerous products of global companies in the OTC and personal care spaces; and various synergistic compositions of Zeta Fractions obtained from living plants from twelve major plant families. He is the President and Co-Founder of Intellebio LLC, a consulting and testing firm focused on the development of novel technologies, advanced test methods, and breakthrough products in the life science field. Dr. Koganov received his Master of Science degree in Biochemistry from the State University, Dnipropetrovsk, USSR; his Ph.D. in Bioelectrochemistry from Institute of Chemical Technology, Dnipropetrovsk, USSR; and Full Doctor of Sciences (Sc.D.) degree in biotechnology from the Higher Attestation Commission of the USSR's Council of Ministers. He has written more than 70 publications, secured over 100 granted patents, and is the author of two books. Dr. Koganov's expertise in the area of plant biotechnology and experience developing novel technologies led to our conclusion that he should serve as a director.

Roger D. O'Brien. Mr. O'Brien has served as a director since his appointment on January 10, 2020 by the Board to fill a vacancy in the Class II director position resulting from the death of Dr. Joseph A. Dunn on November 30, 2019. Mr. O'Brien has served since 2000 as the President of O'Brien Associates, LLC, a general management consulting firm providing advisory and implementation services to companies in a variety of competitive industries, with special focus on general management, technology commercialization, marketing and strategy development. From 1998 to 1999, Mr. O'Brien served as the Chief Operating Officer of Ultralife Batteries, Inc. (NASDAQ: ULBI) and from 1991 to 1996, he was the Chief Executive Officer and a major shareholder of Holotek Ltd., a high-technology company with a proprietary position in the design, development, manufacture and sales of laser imaging systems worldwide. Previously, Mr. O'Brien

served as a senior executive for Exxon Venture Capital, Tenneco Automotive and as an early officer of Sun Microsystems (NASDAQ: SUN) prior to the company's acquisition by Oracle Corporation. Mr. O'Brien is currently a member of the Board of Directors of Innovative Technology Solutions and Bristol-ID Technologies, Inc. In addition, Mr. O'Brien is an adjunct professor at the Rochester Institute of Technology, where he is a graduate instructor in Rochester, New York and in Croatia. Mr. O'Brien holds a Bachelor of Science degree in Nuclear Engineering from New York University and an MBA degree from The Wharton School of the University of Pennsylvania. Mr. O'Brien's experience with strategic advisory consulting and his prior public company experience led to our conclusion that he should serve as a director.

Lucille Salhany. Ms. Salhany became a director in September 2022 pursuant to the terms of the Reorganization and Acquisition Agreement with GVB Biopharma. Ms. Salhany has served as President and Chief Executive Officer of JHMedia, a consulting company she founded, since 1997. She was also one of the founding partners of Echo Bridge Entertainment and CEO & President of LifeFX Networks, Inc. After serving as Chairperson of the Twentieth Television division of Fox, Ms. Salhany was appointed as the Chairmanship of Fox Broadcasting. After chairing Fox, Ms. Salhany accepted the post of Chief Executive Officer and President of United Paramount Network (UPN), launching and growing UPN to become the fifth major broadcast network. She also previously served on the Board of Directors for Echo Bridge Entertainment, Compaq / Hewlett-Packard, Fox, Inc., Avid Technologies, and American Media, Inc. Ms. Salhany was also a trustee of Emerson College and Lasell College, where she received Honorary Doctorates. Ms. Salhany's well-established track record of success in business and strong background in and knowledge of the media industry led to our conclusion that she should serve as a director.

Richard M. Sanders. Mr. Sanders has served as a director since December 9, 2013. Since August 2009, Mr. Sanders has served as a General Partner of Phase One Ventures, LLC, a venture capital firm which focuses on nanotechnology and biotechnology start-up opportunities in New Mexico and surrounding states. From January 2002 until June 2009, Mr. Sanders served as President and CEO of Santa Fe Natural Tobacco Company ("SFNTC"), a division of Reynolds American, Inc., which manufactures and markets the Natural American Spirit cigarette brand. During his 7-year tenure as head of SFNTC, Mr. Sanders tripled Natural American Spirit's market share and SFNTC's operating earnings and directed the successful expansion of Natural American Spirit into international markets in Western Europe and Asia. Prior to directing SFNTC's robust growth, Mr. Sanders worked for R.J. Reynolds Tobacco Company where he began his career as a marketing assistant in 1977. From 1987 to 2002, he served in a wide spectrum of executive positions including,
among others, Senior Vice President of Marketing and Vice President of Sales. A native of Minneapolis, Mr. Sanders earned a Bachelor's Degree in political science from Hamline University in St. Paul and an M.B.A. Degree in Marketing from Washington University in St. Louis, Missouri. Mr. Sanders' deep experience in the tobacco industry and expertise in management and marketing led to our conclusion that he should serve as a director.

Nora B. Sullivan. Ms. Sullivan has served as a director since May 18, 2015. Ms. Sullivan is also currently President of Sullivan Capital Partners, LLC, a financial services company providing investment banking and mergers and acquisitions services to companies seeking acquisitive growth, strategic partnerships and joint venture relationships. Her experience includes the development and advancement of strategic initiatives and the implementation of best practice governance policies. Prior to founding Sullivan Capital Partners in 2004, Ms. Sullivan worked for Citigroup Private Bank from 2000 to 2004, providing capital markets and wealth management services to high net worth individuals and institutional clients. From 1995 to 1999, Ms. Sullivan was Executive Vice President of Rand Capital Corporation (NASDAQ: RAND), a publicly traded closed-end investment management company providing capital and managerial expertise to small and mid-size businesses. Ms. Sullivan is also a member of the Boards of Directors of Evans Bancorp, Inc. (NYSE American: EVBN), Robinson Home Products, and Rosina Food Products. She is also a member of the Investment Committee of the Patrick P Lee Foundation, Chairman of the Technology Transfer Committee of the Roswell Park Comprehensive Cancer Center, and a member of the Board of Directors of the Cortland College Foundation. Ms. Sullivan holds an M.B.A. Degree in Finance and International Business from Columbia University Graduate School of Business and a Juris Doctor degree from the University of Buffalo School of Law. Ms. Sullivan's expertise in finance and corporate governance, experience with mergers and acquisitions and status as an audit committee financial expert led to our conclusion that she should serve as a director.

Executive Officers:

For information with respect to Mr. Mish, please refer to the Directors section above.

R. Hugh Kinsman, *Chief Financial Officer*. Mr. Kinsman has served as our Chief Financial Officer since June 2022. Prior to that time, he was serving as Chief Financial Officer of GVB Biopharma and served in this role since March, 2020 Since 2017, Mr. Kinsman has served as a Director at TerraNova Capital Partners, a boutique investment banking firm, where he has served as CFO of several portfolio companies including iQ International, a leading manufacturer and distributor of highly efficient lead acid batteries for the global automotive and storage markets from 2017 to 2020. Previously, Mr. Kinsman served as a member of the Structured Finance group at GE Capital (NYSE: GE). Mr. Kinsman was also a senior accountant at Asher & Company, CPAs (now BDO). Mr. Kinsman received his B.S. in Finance from Pennsylvania State University and his Master's in Business Administration from Cornell University.

John J. Miller, *President of Tobacco*. Mr. Miller has served as our President of Tobacco since November 2022. Prior to that time, he was the President and CEO of Swisher International, Inc., a manufacturer and exporter of cigars and smokeless tobacco products in America. Mr. Miller joined Swisher in November of 2012 as Senior Vice President of Sales & Marketing, was promoted to President in 2017 and named CEO in March 2021 until his retirement in September 2021. Mr. Miller's experience also includes more than 20 years in various management positions at US Smokeless Tobacco Co. Mr. Miller holds a Bachelor of Science Degree in Finance from UNLV and earned an MBA from Pepperdine University, The George L. Graziadio School of Business Management.

John Franzino, Chief Administrative Officer. Mr. Franzino served as our Chief Financial Officer from June 3, 2020 until November 2021 when he transitioned to Chief Administrative Officer. He has a successful track record of strategic financial leadership in high-growth, highly regulated, consumer-facing industries as well as not-for-profit higher education organizations. Most recently, Mr. Franzino served as Chief Financial Officer of the West Point Association of Graduates, which supports the U.S. Military Academy at West Point. Prior to his experience in higher education, Mr. Franzino served as Chief Financial Officer of Santa Fe Natural Tobacco Company, a subsidiary of Reynolds American, Inc., and as Chief Financial Officer of Labatt USA, a subsidiary of Anheuser-Busch. In both roles, he was responsible for the financial planning and control function as well as information systems and technology. Mr. Franzino is a certified public accountant and holds a Master of Business Administration from Fairleigh Dickinson University and a Bachelor of Arts degree from the University of Maine at Farmington.

Peter Ferola, Chief Legal Officer. Mr. Ferola was promoted to the position of Chief Legal Officer in February 2023. Mr. Ferola has served as our General Counsel and Secretary since November 2022. Mr. Ferola has over 30 years of progressive leadership experience in business management, legal affairs and corporate governance. Most recently, he served as Project Counsel in Greenberg Traurig LLP's corporate securities group. From 2011 to 2020 he served as Senior Vice President and General Counsel at BioTelemetry, Inc. (NASDAQ: BEAT). From 2009 to 2011, Mr. Ferola served as Vice President, General Counsel and Secretary of Nipro Diagnostics, Inc. (formerly Home Diagnostics, Inc., NASDAQ: HDIX). Prior to joining Home Diagnostics, Mr. Ferola worked as a corporate and securities attorney with Greenberg Traurig, LLP and with Dilworth Paxson, LLP in Washington, D.C., focusing on mergers, acquisitions, public securities offerings and corporate governance matters. From 1989 to 2002, Mr. Ferola worked in executive management roles for an American Stock Exchange listed company, most recently serving as Vice President—Administration and Corporate Secretary, overseeing the company's administrative functions, legal matters and investor relations. Mr. Ferola earned a Bachelor of Science and Juris Doctor degree from Nova Southeastern University and a Master of Laws in Securities and Financial Regulation from Georgetown University Law Center. Mr. Ferola has authored numerous articles on corporate and securities laws, with a particular focus on audit committees and regulations implemented in the wake of the Sarbanes-Oxley Act. Mr. Ferola also serves as a FINRA arbitrator and a panelist on the NASDAQ Listing Qualifications Panel.

Corporate Governance

The Company's Board of Directors is classified into three classes of directors, with one class of directors being elected at each annual meeting of stockholders of the Company to serve for a term of three years or until the earlier of: (i) expiration of the term of their class of directors; or (ii) until their successors are elected and take office. The Bylaws of the Company provide that the Board will determine the number of directors to serve on the Board. The number of authorized directors of the Company as of March 1, 2023 is eight, with eight persons currently serving as directors (three Class II directors, two Class I directors and two Class III directors). There are no family relationships among our directors.

Our Board held 8 meetings during 2022. All directors attended at least 75% of all meetings of the Board and Board committees on which they served during 2022. We do not have a formal policy requiring directors to attend annual meetings of stockholders. However, all of our directors attended our 2022 annual meeting and we anticipate that all of continuing directors will attend the 2023 annual meeting.

Our Board of Directors currently has three standing committees: (i) an Audit Committee, (ii) a Compensation Committee, and (iii) a Corporate Governance and Nominating Committee. Each of these Board committees are described below. Members of these committees are elected annually by the Board. The charters of each committee are each available on the investor relations section of our website at www.xxiicentury.com. In addition, we have a Scientific Advisory Board which is chaired by Michael Koganov.

Audit Committee

MEMBERS	KEY RESPONSIBILITIES
Nora B. Sullivan*, Chair **Anthony Johnson** **Richard M. Sanders** **Dr. Michael Koganov** The Board has determined that each member of the audit committee is independent as defined under the applicable listing standards of the Nasdaq Stock Market and Rule 10A-3 under the Securities Exchange Act of 1934, as amended. **The Committee met 4 times in 2022**	▪ Assists the Board in monitoring the integrity of financial statements and our compliance with legal and regulatory requirements; ▪ Reviews the independence and performance of our internal and external auditors; ▪ Has the ultimate authority and responsibility to select, evaluate, terminate and replace our independent registered public accounting firm; ▪ Has oversight of the Company's policies with respect to risk assessment and risk management; and ▪ Approves the Audit Committee Report. The report further details the Audit Committee's responsibilities. *Audit Committee Financial Expert: Our Board has determined that Ms. Sullivan qualifies as an "audit committee financial expert" as defined by the rules of the Securities and Exchange Commission. Furthermore, all members of the Audit Committee meet the financial literacy requirements of the Nasdaq Stock Market and no members of the Audit Committee serves on the Audit Committee of more than three public companies.

Compensation Committee

MEMBERS	KEY RESPONSIBILITIES
Richard M. Sanders, Chair **Nora B. Sullivan** **Dr. Michael Koganov** **Lucille Salhany** The Board has determined that each member of the Compensation Committee is independent within the meaning of the Company's independence standards and applicable listing standards of the Nasdaq Stock Market. **The Committee met 7 times in 2022**	▪ Establishes and regularly reviews our compensation and benefits philosophy and program in a manner consistent with corporate financial goals and objectives; ▪ Approves compensation arrangements for senior management, including annual incentive and long-term compensation; ▪ Administers grants under our equity incentive plans; ▪ Evaluates our CEO's performance; and ▪ Reviews leadership development and succession planning.

Corporate Governance and Nominating Committee

MEMBERS	KEY RESPONSIBILITIES
Anthony Johnson, Chair **Nora B. Sullivan** **Lucille Salhany** The Board has determined that each member of the Corporate Governance and Nominating Committee is independent within the meaning of the Company's independence standards and applicable listing standards of the Nasdaq Stock Market. **The Committee met 6 times in 2022**	▪ Assists our Board in establishing criteria and qualifications for potential Board members; ▪ Identifies high quality individuals who have the core competencies, characteristics and experience to become members of our Board; ▪ Establishes corporate governance practices in compliance with applicable regulatory requirements and consistent with the highest standards, and recommends to the Board the corporate governance guidelines applicable to us; ▪ Leads the Board in its annual review of the Board's performance; ▪ Recommends nominees for each committee of the Board; and ▪ Oversees the Company's Environmental Social and Governance ("ESG") policies and practices.

Scientific Advisory Board

MEMBERS	KEY RESPONSIBILITIES
Dr. Michael Koganov, Chair **James A. Mish** **Anthony Johnson** The Scientific Advisory Board met 1 time in 2022	Provides advice and recommendations to the Board regarding: ▪ Company scientific research, technology and innovation strategies; ▪ opportunities including potential partnerships and M&A; and ▪ emerging science and technology issues and trends.

Director Nominee Selection Process

Our Corporate Governance and Nominating Committee evaluates the specific personal and professional attributes of each director candidate versus those of existing Board members to ensure diversity of competencies, experience, personal history and background, thought, skills and expertise across the full Board. In the evaluation of director candidates, our Corporate Governance and Nominating Committee gives consideration to diversity in terms of gender, ethnic background, age and other similar attributes that could contribute to Board perspective and effectiveness. The Corporate Governance and Nominating Committee also assesses diversity through its annual assessment of Board structure and composition and annual Board and committee performance self-assessment process. We believe that fostering Board diversity best serves the needs of the Company and the interests of its stockholders, and it is one of the many factors considered when identifying individuals for Board membership. We believe that diversity with respect to gender, ethnicity, tenure, experience and expertise is important to provide both fresh perspectives and deep experience and knowledge of the Company.

When vacancies develop, the Corporate Governance and Nominating Committee solicits input regarding potential new candidates from a variety of sources, including existing directors and senior management. From time to time, we have used an executive search firm in search of candidates that have diversity in experience, skills and perspective. Through these and other means, the Board has continued to refresh the Board by adding directors who bring a sufficient range of different perspectives, generate appropriate challenge and discussion, and fulfill its oversight responsibilities to foster significant value creation for our stockholders. The Committee evaluates potential candidates based on their background, experiences and qualifications and also arranges personal interviews of qualified candidates by one or more committee members, other Board members and senior management.

Stockholder Recommendations for Potential Director Nominees

Nominations of persons for election to the Board at the annual meeting may also be made by any stockholder entitled to vote for the election of directors at the meeting who complies with the notice procedures set forth in our bylaws. Such nominations by any stockholder shall be made pursuant to timely notice in writing to the Secretary. To be timely, a stockholder's notice shall be delivered to the Secretary at our principal executive offices not later than the close of business on the ninetieth (90th) day nor earlier than the close of business on the one hundred twentieth (120th) day prior to the first anniversary of the preceding year's annual meeting; provided, however, that in the event that the date of the annual meeting is more than thirty (30) days before or more than seventy (70) days after such anniversary date, notice by the stockholder must be so delivered not earlier than the close of business on the one hundred twentieth (120th) day prior to such annual meeting and not later than the close of business on the later of the ninetieth (90th) day prior to such annual meeting or the tenth (10th) day following the day on which public announcement of the date of such meeting is first made.

Delinquent Section 16(a) Reports

Section 16(a) of the Exchange Act, requires our executive officers, directors, and "beneficial owners" of more than 10% of our common stock to file stock ownership reports and reports of changes in ownership with the SEC. Based on a review of those reports and written representations from the reporting persons, we believe that during 2022, all transactions were reported on a timely basis except for a late Form 3 by R. Hugh Kinsman reporting his initial ownership and a late Form 4 (filed on Form 5) by James A. Mish reporting the withholding of shares to satisfy tax liability upon the vesting of restricted stock.

Code of Ethics

We adopted a Code of Ethics that applies to all our employees. A copy of our Code of Ethics is available on our website at http://www.xxiicentury.com and will be provided to any person requesting same without charge. To request a copy of our Code of Ethics, please make a written request to our General Counsel, c/o 22nd Century Group, Inc., 500 Seneca Street, Suite 507, Buffalo, New York 14204. Future material amendments or waivers relating to the Code of Ethics will be disclosed on our website within four business days following the date of such amendment or waiver.

Item 11. Executive Compensation.

Executive Compensation

Compensation Discussion and Analysis

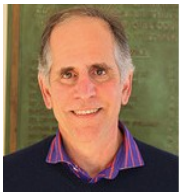
This compensation discussion and analysis describes the material elements of compensation awarded to, earned by, or paid to each of our named executive officers, whom we refer to as our "NEOs," during 2022 and describes our policies and decisions made with respect to the information contained in the following tables, related footnotes and narrative for 2022. The NEOs are identified below under "Our Named Executive Officers." In this compensation discussion and analysis, we also describe various actions regarding NEO compensation taken before or after 2022 when we believe it enhances the understanding of our executive compensation program.

Our Named Executive Officers

James A. Mish
Chief Executive Officer

R. Hugh Kinsman
Chief Financial Officer

John J. Miller
President of Tobacco Division



John Franzino
Chief Administrative Officer

2022 Financial Highlights

2022 was a strong year for us, as we shifted our business to commercial activity, positioned ourselves to meet and out-perform our long-term strategic financial metrics, and accomplished acquisitions intended to strengthen our position in key markets. In April, we commenced a successful Chicago-area pilot program for our VLN® reduced nicotine content tobacco cigarettes with our partner, Circle K, after which we leveraged the pilot results into additional consumer market testing, allowing us to expand distribution to both Illinois and Colorado. In addition to this, our success in those markets has led to the announcement of plans for our launch in Arizona, New Mexico and Utah. We acquired GVB Biopharma in May 2022, which we believe to be the North American leader in cannabinoid supply by volume, commencing revenue

operations in our hemp/cannabis business unit and adding a comprehensive CDMO capability. This acquisition expanded our vertically integrated supply chain capabilities from receptor science to finished white label goods.

We remain confident in the prospect of a robust financial performance in 2023, and intend to achieve such goals, in part, by accelerating the VLN® launch with key national distribution agreements, such that we anticipate selling VLN® in up to eighteen (18) states, representing in excess of 50% of the addressable combustible tobacco cigarette market in the U.S. prior to year-end 2023. We also anticipate scaling GVB revenue and gross margin to achieve cash-positive operating results in 2023, as well as the ability to expand capital to fuel growth through our new $21.1M lending facility.

Our Executive Compensation Philosophy and Design

Our executive compensation programs are driven by a pay-for-performance philosophy that is directly linked to our business strategies and company-wide goals. Prior to the FDA's authorization of the marketing of our VLN® King and VLN® Menthol King reduced nicotine content cigarettes as modified risk tobacco products (MRTPs) in December 2021 and our May 2022 acquisition of GVB Biopharma, our business had historically been focused on developing products through research and development and securing regulatory approval to market and sell such products. While we had limited revenues through the sale of SPECTRUM® research cigarettes and contract manufacturing of cigarettes and filtered cigars, we believe the primary driver of stockholder value was derived from the success of our rollout of our new our VLN® King and VLN® Menthol King reduced nicotine content cigarettes as well as the development of disruptive, plant-based solutions for the life science, consumer product, and pharmaceutical markets that we license to third parties and/or manufacture and sell. Accordingly, our compensation program has historically focused less on objective financial metrics typically applicable to other companies. As our Company transitions from a research and development based platform to a revenue generating business model, the Compensation Committee, after thoughtful deliberations, intends to update the compensation program for 2023 for further alignment with long-term interests of stockholders. Specifically, metrics to assess performance of the named executive officers will be based on more objective quantitative metrics including but not limited to revenue and other financial metrics.

Our Pay for Performance Philosophy

Our Compensation Committee seeks to attract and retain executive officers who have the experience, temperament, talents and convictions to drive our future success. Our compensation programs are designed to:

- motivate our executives by providing compensation that is directly linked to both our short- and long-term performance;
- tightly align their incentives and economic interests with our stockholders to build long-term stockholder value by delivering a substantial portion of our executive officer's compensation through equity awards; and
- ensure that our executive compensation program is designed and administered in a manner that appropriately manages risk to safeguard the interests of our stockholders', as well as our employees'.

We have designed our executive compensation program with specific features to help achieve these goals and to promote related objectives that are important to our long-term success.

Roles and Responsibilities

Our Compensation Committee has primary responsibility for, among other things, determining our compensation philosophy, evaluating the performance of our executive officers, setting the compensation and other benefits of our executive officers, overseeing the Company's response to the outcome of the advisory votes of stockholders on executive compensation (as discussed below), assessing the relative enterprise risk of our compensation program and administering our incentive compensation plans.

Our Board, our Compensation Committee and our CEO each play a role in setting the compensation of our NEOs. Our Board appoints the members of our Compensation Committee and delegates to the Compensation Committee the direct responsibility for overseeing the design and administration of our executive compensation program. Our Board and our Compensation Committee value the opinions of our stockholders and are committed to ongoing engagement with our stockholders on executive compensation practices. As discussed below, the Compensation Committee specifically considers the results from the annual stockholder advisory vote on executive compensation in making compensation decisions.

In February 2022, our Compensation Committee engaged the governance consulting firm of Morrow Sodali to assist with Say-on-Pay and the election of new directors.

In August 2022, our Compensation Committee engaged the compensation consulting firm of Pay Governance to assist the Committee in developing a peer group to benchmark executive compensation against other biotechnology, pharmaceutical and life science companies with similar revenues and market capitalizations. Pay Governance then reviewed our current executive compensation program and made recommendations with respect to future compensation decisions.

To assure independence, the Compensation Committee pre-approves all other work unrelated to executive compensation proposed to be provided by any compensation consultant it engages and considers all factors relevant to their independence from management, including but not limited to the following factors:

- The provision of other services that the consultant provides to us;
- The amount of fees received from us as a percentage of the consultant's total revenue;
- The consultant's policies and procedures designed to prevent conflicts of interest;
- Business or personal relationships of the consultant with our Compensation Committee members;
- The amount of our stock owned by the consultant; and
- Business or personal relationships of the consultant with our executive officers.

Our Say-on-Pay Vote; Stockholder Outreach

The Board and Compensation Committee are committed to soliciting feedback to inform the Board's decisions and guide our compensation program. Our stockholder outreach in 2021, 2022 and into 2023 provided the Board with valuable insights into our stockholders' perspectives on our executive compensation. We are committed to sound compensation practices and will continue to enhance our compensation program as a result of stockholder input.

We have followed a consistent approach to the design of our executive compensation program for many years. The history of our Say-on-Pay results before 2020 generally demonstrated stockholder support for our program over several years. At our 2022 Annual Meeting of Stockholders, approximately 10.5% of our outstanding shares voted against our 2022 executive compensation resolution. As noted below, we conducted a Board-driven stockholder outreach and engaged with our top holders to better understand their concerns.

Following the 2022 Annual Meeting of Stockholders, the Compensation Committee commenced a stockholder outreach program. This outreach focused on better understanding the perspectives of our stockholders with regard to our executive compensation program structures and best practices in aligning executive compensation to the interests of our stockholders.

The executive compensation outreach initiative is in addition to our regular ongoing stockholder engagement. As part of our ongoing outreach efforts to inform our corporate policies, the Company proactively reached out to filing institutional stockholders to discuss the Company's executive compensation philosophy, goals and plans and to obtain an understanding of our stockholders' concerns in advance of this filing. Approximately 19.4% of the Company's outstanding shares of common stock were owned by filing institutional stockholders.

By The Numbers: Stockholder Engagement

We contacted **15** of our top institutional stockholders, representing approximately **10%** of our total shares outstanding and approximately **53%** of our shares held by institutional stockholders, with invitations to meet with our management and directors. These institutional stockholders represent the majority of our institutional investors at this time.	Our Independent Board Chair and Chair of our Compensation Committee participated in **all** of the stockholder engagement meetings.

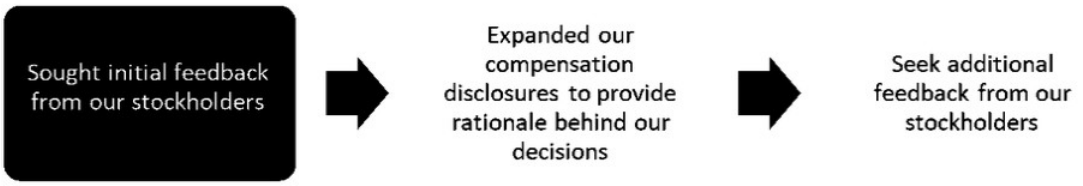
Feedback from Stockholder Engagement

We heard a range of perspectives on our executive compensation program from stockholders during our outreach, all of which were considered by our Compensation Committee and the Board.

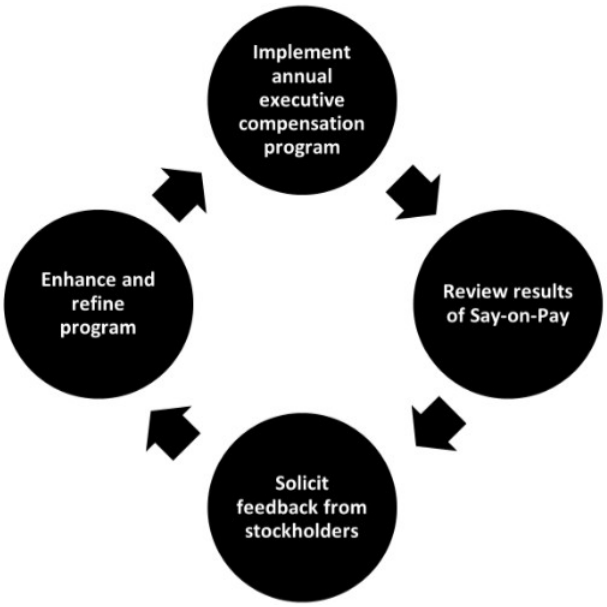
Our stockholders expressed a continuing desire to understand the specifics behind our executive compensation plan design including, rationale, key performance indicators, and qualitative metrics that align to both the short, mid and long-term strategy of the Company.

What We Heard		How We Are Responding
Desire to see expanded disclosure of our compensation philosophy, design and rationale.	→	We have greatly expanded our Compensation Discussion and Analysis to provide more specific details into our compensation programs and philosophy and the rationale behind our compensation decisions.

Our work to solicit stockholder feedback into our executive compensation program continues into the future.



Following each annual meeting of stockholders, our Compensation Committee will review the Say-on-Pay results and engage with our stockholders to solicit feedback on our compensation program. Our Compensation Committee will use the stockholder feedback to inform and guide its compensation decisions for the following year. Our annual compensation cycle is generally as follows:



Elements of Executive Compensation

Our compensation program consists of the following three primary elements:

(1) *Base Salary.* We provide a base salary for each NEO based on their job description and scope of responsibilities of that position. We target the base salary for each NEO at the 50th percentile range of our peer group (discussed below) for each position. Our philosophy is to have a significant portion of each NEO's total cash compensation "at-risk."

(2) *Annual Cash Bonus Opportunity*. The annual cash bonus is our primary short-term performance incentive. Our NEO target bonus awards range from 75% to 150% of their base pay, representing the "at risk" portion of the NEO's total cash compensation. The Compensation Committee aims to set performance goals for cash bonuses that align pay with performance. During 2022 and in prior years, our Compensation Committee prioritized the accomplishment of critical strategic and operational milestones. With the Company entering into its revenue phase with the roll-out of its VLN cigarettes and acquisition of GVB Biopharma, the Compensation Committee expects to focus performance measures in 2023 and in the future on more objective quantitative metrics including but not limited to revenue and other financial metrics.

(3) *Long-Term Incentive Awards*. Long-term incentive awards are our primary retention tool and serve to provide for the continuity of key executives with incentives that align our executives' interests with those of our stockholders'. For 2021 and 2022, these long-term incentive awards were generally comprised of restricted stock units with multi-year vesting, subject to continued service with us. Beginning in 2023, we expect to enhance our Long-Term Incentive Program by introducing performance-based equity awards to the award mix.

Peer Group

We endeavor to set total compensation, which consists of base salary, annual cash bonuses and the expected value of long-term incentives, for target performance levels in range of the expected median of peer companies, depending on various factors including the experience level of the individual executive and competitive market conditions. We use our peer group median compensation values to help determine the optimal compensation mix and as a general guide to determine salary recommendations, target annual cash bonus opportunity, and target annual long-term incentive value for each executive position. Compensation for top executives can be highly variable due to heavy weighting toward incentive compensation rather than fixed components.

With the assistance of Pay Governance, during late 2022, our Compensation Committee established a peer group consisting primarily of similarly situated biotechnology, pharmaceutical and life science companies with revenues and a market capitalization similar to ours. The peer group established consists of the following companies:

Achieve Life Sciences	AquaBounty Technologies	Avid Bioservices	Benson Hill	Charlotte's Web Holdings
ChromaDex Corporation	Cronos Group	GreenLight Biosciences	Hawkins	Jushi Holdings
Laird Superfood	Landec Corporation	Pear Therapeutics	PRECIGEN	Societal CDMO
The Valens Company	TILT Holdings	Village Farms International	Zynerba Pharmaceuticals	

Base Salary

We pay our NEOs a base salary to compensate them for services rendered and to provide them with a steady source of income for living expenses throughout the year. We have historically determined the base salary of each NEO based on the job description and scope of responsibilities of that position and assign each position a target annual salary equal to the base salary in the 50th percentile range of the Survey Group. After a base salary is set initially, we have historically provided a base salary increase of 0% - 5% annually depending on the performance of the NEO during the prior year and taking into account any other factors, such as recent salary increases, bonuses or other compensation. Every two to three years, we generally reviewed each NEO's salary against a peer group of similarly situated companies and made salary increases to the extent necessary to maintain a base salary in the 50th percentile range of such group. In 2023 and into the future, we expect to target annual salary equal to the base salary in the 50th percentile range of the peer group described above.

For 2022, we took the following actions with respect to the base salaries of our NEOs:

- James Mish's base salary increased from $450,000 to $472,500, a 4% increase.
- John Franzino's base salary increased from $315,000 to $330,750, a 5% increase.
- John Miller joined the Company in 2022 with a base salary of $425,000.
- R. Hugh Kinsman joined the Company in 2022 with a base salary of $290,000.

In February 2023, our Compensation Committee reviewed the 2022 base salaries our NEOs in connection with the establishment of the new peer group. Other than Mr. Kinsman, no other NEO received a base salary increase because our NEOs base salaries were generally within the 50th percentile range of the peer group described above for their respective positions. Hugh Kinsman's salary was increased based on his individual performance and in order to bring his salary closer to the 50th percentile range for CFO's in the established peer group. The base salaries of each of our NEOs for 2023 is as follows:

Name	2023 Base Salary	Percentage Increase Over 2022 Base Salary
James A. Mish	$486,675	3%
John Franzino	$330,750	0%
John Miller	$425,000	0%
R. Hugh Kinsman	$370,000	28%

2022 Annual Cash Bonus Opportunity

In general, our NEO target bonus awards range from 75% - 150% of an NEOs base salary depending on their position. The Compensation Committee aims to set performance goals for cash bonuses that align pay with performance. A number of factors are considered when calibrating goals, including the Company's business strategies and company-wide goals. Prior to entering into its revenue phase, our Compensation Committee believed that the primary driver of stockholder value was derived from the development of disruptive, plant-based solutions for the life science, consumer product, and pharmaceutical markets that we license to third parties and/or manufacture and sell. Accordingly, our compensation program has historically focused less on objective metrics typically applicable to other companies. In 2023, with the Company entering into its revenue phase with the roll-out of its VLN® cigarettes and acquisition of GVB Biopharma, the Compensation Committee intends to introduce quantitative performance measures such as revenue and other financial metrics for a direct link to executive pay.

For 2022, we did not weight individual goals or achievements in setting our potential cash bonus awards because our Compensation Committee desired to maintain flexibility in awarding cash bonuses to our NEOs for their performance during the year and to provide flexibility to our NEOs to advance our strategic position or goals as a company in one or more areas opportunistically. In addition, our cash bonus awards included an element of discretion as relegated to the Compensation Committee in order to compensate NEOs that performed extraordinarily well and incentivize and motivate our NEOs.

For 2022, our Compensation Committee challenged our NEOs with a number of strategic goals and objectives for 2022, including but not limited to:

- Launch of VLN® reduced nicotine content cigarettes internationally;
- Launch of VLN® reduced nicotine content cigarettes nationally following the successful pilot launch;
- Increase gross profit for cigar and cigarette contract manufacturing operations by $1,000,000;
- Advance VLN® through securing strategic partnerships;
- Increase regulatory and legislative advocacy for VLN®, as well as within the hemp and cannabis business units;
- Develop intellectual property for next generation VLN® blends;
- Develop merger & acquisition strategy and business plan for hemp cannabis division;
- Develop innovative intellectual property for hemp cannabis, tobacco and hops products;
- Increase cash position though capital markets activities;
- Enhance operational finance process/reports;
- Improve human resources and IT functions and processes; and
- Establish compensation benchmarking.

At the end of the year, the Compensation Committee reviews each NEO's individual performance objectives and goals against their performance during the year, which performance is rated by both the individual NEO through a self-assessment as well as a review of performance by the CEO (for NEOs other than himself) and the Compensation Committee. The target cash bonus amounts (and percentage of base salary) and the actual cash bonuses earned by our NEOs for 2022 are as follows:

Name	Target Cash Bonus (and percentage of Base Salary)	Actual Cash Bonus Earned	Bonus Earned as a % of Target
James A. Mish	$708,750 (150%)	$481,950	68%
John Franzino	$248,062 (75%)	$238,140	96%
R. Hugh Kinsman	$217,500 (75%)	$90,575	50%
John Miller	$318,750 (75%)	$160,000	50%

2022 Long-Term Incentive Program Awards

Our Compensation Committee strongly believes that using equity awards with multi-year vesting periods reinforces the alignment of the interests of executives with those of stockholders and assists us to retain our executives. We maintain our omnibus incentive plan for the purpose of granting various types of equity awards, including restricted stock units, to provide incentives for management to increase stockholder value. In addition, the multi-year nature of the vesting periods encourages executives to stay with the Company, which is important to us in light of the competitive labor market for talented executives.

Our Compensation Committee has authority to determine eligible participants, the types of awards and the terms and conditions of awards. As part of their total compensation package, each NEO is assigned an annual dollar value target for these long-term incentive plan awards that is adjusted up or down depending on the individual's and the Company's actual performance during the prior year. For 2021 and 2022, NEOs were generally awarded restricted stock units with a three-year vesting period, subject to continued service with us. The number of restricted stock units for each award is determined by converting the dollar value into a number of shares based on our average closing stock price during the six months preceding the award date. The Compensation Committee expects to continue this practice in 2023.

During 2022, Mr. Miller received an award of 750,000 performance shares, with one-third of such shares vesting annually in 2023, 2024 and 2025 provided that our tobacco business plan revenue objectives and other performance requirements are satisfied. The performance shares were issued to incentivize Mr. Miller to successfully roll-out our VLN® pilot program. For 2022, our Compensation Committee determined that Mr. Miller earned 150,000 of the initial one-third tranche of such shares in light of his performance in consulting and then ultimately leading our VLN® roll-out strategy and business plan. In addition, during 2022, Mr. Mish received a special equity award of 950,000 restricted stock units vesting annually over a two-year period plus his normal three-year vesting award. The special equity award was issued to Mr. Mish as a catch-up issuance from 2020 and 2021.

The long-term incentive plan awards are used to motivate and retain employees as well as promote employee stock ownership. We do not issue the shares until the vesting conditions have been satisfied. We currently do not use stock options as part of our compensation package. Since we grant fewer shares with these types of awards than we would have granted in the form of options, stock grants help us manage dilution that we would otherwise experience in granting options.

As we continue to grow, our Compensation Committee is committed to exploring ways to further and more directly tie future long-term incentive plan award vesting to performance and the achievement of future company and individual goals.

For 2022, we awarded our NEOs the following RSUs:

Name	RSU Grant Value	Number of Shares
James A. Mish[(1)]	$3,025,989	1,381,730
John Franzino	$264,736	120,884
John Miller[(2)]	$982,500	750,000[(2)]
R. Hugh Kinsman[(3)]	N/A	N/A

(1) Comprises a one-time RSU grant of 950,000 vesting 50% over two (2) years and an annual grant of 431,730 vesting over three (3) years.
(2) Represents performance shares, as discussed above.
(3) Due to the timing of his appointment, Mr. Kinsman was not awarded a long-term equity incentive award during 2022.

SUMMARY COMPENSATION TABLE FOR 2022

The following table summarizes the compensation of our NEOs for 2022. The amounts reported for stock awards may not represent the amounts that the NEOs will actually realize from the awards. Whether, and to what extent, a named executive officer realizes value will depend on our performance, stock price and continued employment.

Name and Principal Position	Year	Salary	Bonus	Option Awards (1)	Stock Awards (2)	All Other Compensation (3)	Total
James A. Mish	2022	$ 470,976	$ 481,950	$ —	$ 3,025,989	$ 32,179	$ 4,011,094
Chief Executive Officer	2021	$ 452,763	$ 608,000	$ —	$ 1,440,000	$ 33,721	$ 2,534,484
	2020	$ 241,093	$ 675,000	$ —	$ 118,230	$ 8,760	$ 1,043,083
R. Hugh Kinsman (4)	2022	$ 160,033	$ 90,575	$ —	$ —	$ 4,646	$ 255,254
Chief Financial Officer							
John J. Miller (5)	2022	$ 277,836	$ 160000	$ —	$ 982,500	$ 19,625	$ 1,439,961
President of Tobacco							
John Franzino	2022	$ 294,606	$ 238,140	$ —	$ 264,736	$ 30,323	$ 824,805
Chief Administrative Officer	2021	$ 308,849	$ 200,813	$ —	$ 576,000	$ 26,179	$ 1,111,841
	2020	$ 158,213	$ 125,000	$ —	$ 142,005	$ 10,030	$ 435,248
Michael J. Zercher	2022	$ 291,923	$ —	$ —	$ 416,525	$ 726,962	$ 1,479,909
Former President and Chief Operating Officer	2021	$ 368,060	$ 638,100	$ 192,950	$ 1,440,000	$ 33,721	$ 2,672,831
	2020	$ 366,431	$ 366,100	$ —	$ 447,831	$ 31,970	$ 1,212,332
Richard Fitzgerald	2022	$ 159,892	$ —	$ —	$ 273,141	$ 4,473	$ 437,505
Former Chief Financial Officer	2021	$ 43,860	$ 75,000	$ —	$ —	$ 807	$ 119,667

(1) Represents the grant date fair value computed in accordance with FASB ASC 718. The assumptions used for the option awards are set forth in Note 15 “Equity Based Compensation” of the Notes to the Consolidated Financial Statements contained in Item 8 of this report.
(2) The fair value of each restricted stock unit is based on the stock price of the Company’s common stock on the grant date of the award.
(3) All Other Compensation consists of the following:

Name	Year	Fringe Benefits *	Severance	Employer Contributions to Company 401(k) Plan	All Other Compensation Total
James A. Mish	2022	$ 23,029	$ —	$ 9,150	$ 32,179
R. Hugh Kinsman	2022	$ 3,977	$ —	$ 669	$ 4,646
John J. Miller	2022	$ 19,625	$ —	$ —	$ 19,625
John Franzino	2022	$ 21,173	$ —	$ 9,150	$ 30,323
Michael J. Zercher	2022	$ 21,150	$ 691,662	$ 9,150	$ 726,962
Richard Fitzgerald	2022	$ 4,473	$ —	$ —	$ 4,473

* Includes Company paid premiums for health insurance, dental insurance, group-term life insurance, and long-term disability insurance.

(4) Mr. Kinsman joined the Company in May 2022.
(5) Mr. Miller joined the Company in May 2022.

CEO Pay Ratio

We have estimated the ratio between our 2022 Chief Executive Officer’s total compensation and the median annual total compensation of all employees (except the Chief Executive Officer). In searching for the median employee we considered taxable compensation totals in 2022. We identified the “Median Employee” based on the taxable compensation of all active full-time and part-time employees employed by us on December 31, 2022 (annualizing salaries for hires made mid-year), then we calculated the Median Employee’s compensation under the Summary Compensation Table rules. Our Chief Executive Officer had annual total compensation in 2022 of $4,011,094 and our Median Employee had annual total compensation of $55,150. Therefore, we estimate that our Chief Executive Officer’s annual total compensation in 2022 is 73 times that of the median of the annual total compensation of all of our employees.

Grants of Plan-Based Awards

GRANTS OF PLAN BASED AWARDS DURING 2022

As described above in the Compensation Discussion and Analysis, we granted restricted stock units to our NEOs in 2022. The following table sets forth information regarding all such awards:

Name	Grant Date	Date of Board Action	Restricted Stock Unit Awards: Number of Shares of Stock (#)	Stock Option Awards: Number of Shares (#)	Exercise Price of Option Awards ($)	Grant Date Fair Value Restricted Stock Units, Stock Awards and Option Awards ($) (2)
James A. Mish	3/21/2021	3/19/2022	431,730 (1)	—	—	$ 945,489
	3/21/2022	3/21/2022	950,000 (2)	—	—	$ 2,080,500
R. Hugh Kinsman	—	—	—	—	—	$ —
John J. Miller	10/31/2022	10/31/2022	750,000 (3)	—	—	$ 982,500
John Franzino	3/21/2022	3/21/2022	120,884 (1)	—	—	$ 264,736
Richard Fitzgerald	3/21/2022	3/21/2022	124,722 (1)	—	—	$ 273,141
Michael J. Zercher	3/21/2022	3/21/2022	210,742 (1)	—	—	$ 461,525

(1) Represents RSUs which vest in equal increments over three years on March 21, 2023, 2024 and 2025, subject to continued service.
(2) Represents RSUs which vest in equal increments over two years on March 21, 2023 and 2024, subject to continued service.
(3) Represent an award of 750,000 performance shares, with one-third of such shares vesting on each of May 1, 2023, 2024 and 2025 provided that our tobacco business plan revenue objectives and other performance requirements are satisfied at such times

Outstanding Equity Awards

The following table sets forth information about outstanding equity awards held on December 31, 2022 by our NEOs.

Name	Number of Securities Underlying Unexercised Options Exercisable (#)	Number of Securities Underlying Unexercised Options Unexercisable (#)	Option Exercise Price	Option Expiration Date	Equity Incentive Plan Awards: Number of Unearned Shares, Restricted Stock Units or Other Rights That Have Not Vested (#)	Equity Incentive Plan Awards: Market or Payout Value of Unearned Shares, Restricted Stock Units or Other Rights That Have Not Vested ($) (5)
James A. Mish	—	—	—	—	431,730 (1)	$ 397,623
	—	—	—	—	950,000 (2)	$ 874,950
	—	—	—	—	300,000 (3)	$ 276,300
R. Hugh Kinsman	—	—	—	—	—	$ —
John J. Miller	—	—	—	—	750,000 (4)	$ 690,750
John Franzino	—	—	—	—	120,884 (1)	$ 111,334
	—	—	—	—	120,000 (3)	$ 110,520
Richard Fitzgerald	—	—	—	—	—	$ —
Michael J. Zercher	650,000	—	$ 1.07	9/30/2024	—	$ —
	68,000	—	$ 1.39	9/30/2024	—	$ —
	77,875	—	$ 2.76	9/30/2024	—	$ —
	85,000	—	$ 3.2	9/30/2024	—	$ —

(1) Represents RSUs which vest in equal increments over three years on March 21, 2023, 2024 and 2025.
(2) Represents RSUs which vest in equal increments over two years on March 21, 2023 and 2024.
(3) Represents RSUs which vest in equal increments over two years on March 19, 2023 and 2024.
(4) Represents performance shares, with one-third of such shares vesting on each of May 1, 2023, 2024 and 2025 provided that our tobacco business plan revenue objectives and other performance requirements are satisfied at such times.
(5) The amounts in this column are based on the closing stock price of the Company's common stock on December 31, 2022. These amounts do not reflect the actual amounts that may be realized.

Option Exercises and Stock Vested in 2022

Name	Option Awards		Stock Awards	
	Number of Shares Acquired on Exercise (#)	Value Realized on Exercise ($)	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting ($) (1)
James A. Mish	—	$ —	150,000	$ 352,500
R. Hugh Kinsman	—	$ —	—	$ —
John J. Miller	—	$ —	—	$ —
John Franzino	—	$ —	135,000	$ 281,750
Richard Fitzgerald	—	$ —	—	$ —
Michael J. Zercher	—	$ —	906,802	$ 1,342,044

(1) The value realized on vesting is based on the closing stock price of the Company's common stock on the date of vesting or date of exercise. The amount does not reflect the actual amount that may be realized.

Pay for Performance

Year	Summary Compensation Table Total for PEO (1)	Compensation Actually Paid to PEO (2)	Average Summary Compensation Table Total for Non-PEO-NEOs (3)	Average Compensation Actually Paid to Non-PEO-NEOs (2)	Value of Initial Fixed $100 Investment Based on Total Shareholder Return	Net Income (Loss)
2022	$ 4,011,094	$ 1,495,978	$ 888,087	$ 411,232	$ 84	$ (59,801)
2021	$ 2,534,464	$ 2,829,984	$ 1,301,446	$ 895,493	$ 281	$ (32,609)

(1) Consists of compensation payable to our CEO, James A. Mish.
(2) Total summary compensation amount is adjusted as (i) less total equity compensation, (ii) plus the fair value of unvested shares as of December 31, 2022 of current year equity awards, (iii) plus or minus the change in fair value of unvested shares as of December 31, 2022 of prior year equity awards, (iv) plus or minus the change in fair value of vested shares during 2022 of prior year equity awards as of the vesting date, (v) plus the fair value of equity awards granted and vested in the current year, as of the vesting date.
(3) For 2022, consists of compensation payable to John Franzino, Michael J. Zercher, R. Hugh Kinsman, John J. Miller and Richard Fitzgerald. For 2021, consists of compensation payable to Richard Fitzgerald, John Franzino and Michael J. Zercher.

Employment Agreements with Named Executive Officers

We have entered into employment agreements with each of our NEOs as follows:

James A. Mish. Pursuant to the employment agreement entered into between James A. Mish and the Company on May 22, 2020, Mr. Mish will earn an initial base salary of $450,000 (which has been increased to $491,400) and shall be eligible for future cash bonuses and awards of performance units as a percentage of base salary based on the achievement of performance targets to be established by the Company. As a one-time inducement, the Company agreed to an award of 150,000 RSUs, vesting on the one-year anniversary of the date of grant, subject to continued service.

If Mr. Mish's employment is terminated by the Company without Cause or by such executive for Good Reason (as such terms are defined in the employment agreement), then he will be entitled to a severance benefit in the form of (i) a continuation of his then-base salary for a period ending on the earlier of 12 months or the remaining term of the employment agreement (plus continuing health care coverage during such period) and (ii) the payment of a pro-rated bonus award.

R. Hugh Kinsman. Pursuant to the employment agreement entered into between R. High Kinsman and the Company on June 15, 2022, Mr. Kinsman will earn an initial base salary of $290,000 (which has been increased to $301,600) and he shall be eligible for future cash bonuses and awards of performance units as a percentage of base salary based on the achievement of performance targets to be established by the Company. If Mr. Kinsman's employment is terminated by the Company without Cause (as defined in the employment agreement), then he will be entitled to a severance benefit in the

form of a continuation of his then-base salary for a period of 12 months (plus continuing health care coverage during such period).

John Franzino. Pursuant to the employment agreement entered into between John Franzino and the Company dated April 8, 2020, Mr. Franzino earned an initial base salary of $250,000 (which has been increased to $343,980) and shall be eligible for future cash bonuses and equity awards. As a one-time inducement, the Company agreed to an award of 100,000 RSUs, with 50,000 RSUs vesting on the one-year anniversary of the date of grant and 50,000 RSUs vesting on the two-year anniversary of the grant date, subject to continued service.

If Mr. Franzino's employment is terminated by the Company without Cause or by such executive for Good Reason (as such terms are defined in the employment agreement), then he will be entitled to a severance benefit in the form of (i) a continuation of his then-base salary for a period of 12 months and (ii) the payment of any earned but unpaid bonus award.

The employment agreement of Mr. Franzino also provides that in the event of a change in control (as defined in his employment agreement) of our Company, then during the three (3)-year period following such change in control if certain triggering events occur, such as if he is terminated other than for Cause (as defined in his employment agreement), death or disability, or if his responsibilities are diminished after the change in control as compared to his responsibilities prior to the change in control, or if his base salary or benefits are reduced, or he is required to relocate more than twenty-five (25) miles from his then current place of employment, then in any such events he will have the option, exercisable within ninety (90) days of the occurrence of such an event, to resign his employment with us, in which case he will be entitled to receive: (a) his base salary for twelve (12) months thereafter; and (b) the immediate vesting of all options and/or restricted stock grants previously granted or to be granted to him.

John Miller. We entered into an employment agreement with Mr. Miller for an initial term until May 2025 pursuant to which he earns an annual base salary of approximately $425,000 and previously received an award of 750,000 performance shares, with one-third of such shares vesting on each of May 1, 2023, 2024 and 2025 provided that the Company's tobacco business plan revenue objectives and other performance requirements are satisfied at such times. The performance shares shall automatically vest upon the occurrence of change in control of the Company or similar event or in the event Mr. Miller terminates his employment for "Good Cause"; which means either an involuntary reduction in pay, change in reporting structure or a requirement to relocate.

Compensation on Termination of Employment

The following table illustrates the additional compensation that we estimate would be payable to each of our NEOs on termination of employment under each of the circumstances described above, assuming the termination occurred on December 31, 2022. The amounts shown are estimates and do not necessarily reflect the actual amounts that these individuals would receive on termination of employment.

Estimated Additional Compensation Triggered by Termination of Employment If Termination on the Last Business Day of 2022

Name	Salary Multiple	Salary	Fringe Benefits (1)	Early Vesting of Restricted Stock Units (2)	Early Vesting of Stock Options	Total
Termination by the Company Without Cause or by the Executive for Good Reason						
James A. Mish	1x	$ 486,675	$ 21,488	$ 1,548,873	$ —	$ 2,057,037
R. Hugh Kinsman	1x	$ 370,000	$ 21,367	$ —	$ —	$ 391,367
John J. Miller	1x	$ 425,000	$ 21,488	$ 690,750	$ —	$ 1,137,238
John Franzino	1x	$ 330,750	$ —	$ 221,854	$ —	$ 552,604
Death or Disability						
James A. Mish	n/a	$ —	$ —	$ 1,548,873	$ —	$ 1,548,873
R. Hugh Kinsman	n/a	$ —	$ —	$ —	$ —	$ —
John J. Miller	n/a	$ —	$ —	$ 690,750	$ —	$ 690,750
John Franzino	n/a	$ —	$ —	$ 221,854	$ —	$ 221,854
Change of Control with Triggering Event						
James A. Mish	1x	$ 486,675	$ 21,488	$ 1,548,873	$ —	$ 2,057,037
R. Hugh Kinsman	1x	$ 370,000	$ 21,367	$ —	$ —	$ 391,367
John J. Miller	1x	$ 425,000	$ 21,488	$ 690,750	$ —	$ 1,137,238
John Franzino	1x	$ 330,750	$ —	$ 221,854	$ —	$ 552,604

(1) Health and dental insurance payments and group-term life insurance and long-term disability insurance payments have been estimated based on current rates for a period of 12 months.
(2) The dollar amount is calculated based on the closing price of our common stock on December 31, 2022.

Compensation Committee Report

For the year ended December 31, 2022, the Compensation Committee reviewed and discussed the CD&A with our management. Based on this review and discussion, the Compensation Committee recommended to our Board of directors that the CD&A be included in this Annual Report on Form 10-K.

Richard M. Sanders, Chair
Anthony Johnson
Roger O'Brien
Nora B. Sullivan

Compensation Committee Interlocks and Insider Participation

During the last fiscal year, no member of the Compensation Committee had a relationship with us that required disclosure under Item 404 of Regulation S-K. During the past fiscal year, none of our executive officers served as a member of the Board of Directors or Compensation Committee, or other committee serving an equivalent function, of any entity that has one or more executive officers who served as members of our Board of Directors or our Compensation Committee. None of the members of our Compensation Committee is an officer or employee of our Company, nor have they ever been an officer or employee of our Company.

Director Compensation

Non-employee directors are compensated for their service on our Board as shown below. Directors who are employees of the Company receive no additional compensation for serving as directors. The Compensation Committee periodically reviews the compensation of our non-employee directors and considers market practices. In February 2021, the Compensation Committee retained Korn Ferry ("KF") to conduct an independent assessment of our director compensation versus the competitive market and the "fit" of our compensation program to our pay philosophy. To establish the competitive market for directors, KF identified a comparator group of 17 publicly traded companies in the United States and Canada within the biotechnology and pharmaceuticals industries with median revenues of $95 million and median market capitalizations of $1.2 billion. Based on the KF review, the Compensation Committee recommended, and the Board approved, the following director compensation for 2022:

Annual cash retainer:	$ 75,000
Additional annual cash retainer for:	
Chair of the Board	$ 50,000
Chair of a Board Committee	$ 20,000
Member of a Board Committee	$ 10,000
Annual RSU award value:	$ 135,000

During 2022, the Compensation Committee retained Pay Governance LLC ("Pay Governance") to conduct an independent assessment of our director compensation versus a peer group that was developed (see "Compensation Discussion and Analysis – Peer Group" for a discussion of our peer group). Based on the Pay Governance review, the Compensation Committee approved maintaining the 2022 level of non-employee director compensation for 2023.

As with many small cap companies, our stock price has been volatile historically. For example, between January 1, 2019 and December 31, 2022, our stock price ranged from a low of $0.55 per share to a high of $6.07 per share. In order to eliminate some of the volatility from our stock price when making equity awards, in 2020 our Compensation Committee decided to implement a policy to determine the number of RSUs to issue for annual awards by dividing the annual RSU award value approved by the Compensation Committee ($135,000) with the average closing stock price over the six months prior to the date of the award. As a result of this policy, the grant date fair value of our RSU awards reported in our Director Compensation table below will vary (up or down) from the annual RSU award value approved by the Compensation Committee depending on the closing market price on the date of the award and the average market price over the prior six months. Our Compensation Committee expects to adhere to this policy for director RSU awards made during 2023 and will evaluate the policy annually.

NON-EMPLOYEE DIRECTOR COMPENSATION FOR 2022

Name	Fees earned or paid in cash	Option Awards	Restricted Stock Unit Awards[1]	All Other Compensation	Total
Clifford B. Fleet	$ 105,000	$ —	$ 113,460	$ —	$ 218,460
Anthony Johnson	$ 105,000	$ —	$ 113,460	$ —	$ 218,460
Michael Koganov	$ 105,000	$ —	$ 113,460	$ —	$ 218,460
Roger D. O'Brien	$ 127,500	$ —	$ 113,460	$ —	$ 240,960
Richard M. Sanders	$ 135,000	$ —	$ 113,460	$ —	$ 248,460
Lucille S. Salhany[2]	$ 30,014	$ —	$ 28,440	$ —	$ 58,454
Nora B. Sullivan	$ 195,000	$ —	$ 113,460	$ —	$ 308,460

(1) The fair value of each restricted stock unit is based on the stock price of the Company's common stock on the grant date of the award.
(2) Ms. Salhany was appointed as a director on September 7, 2022 and received pro rata compensation for service during 2022.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The following table sets forth information regarding the beneficial ownership of our common stock as of March 1, 2023, by (i) each of our current directors and executive officers, and (ii) all our current directors and executive officers as a group. To our knowledge, no person owns more than 5% of our common stock, Derivative securities exercisable or convertible into shares of our common stock within sixty (60) days of March 1, 2023 are deemed to be beneficially owned and outstanding for computing the share ownership and percentage of the person holding securities but are not deemed outstanding for computing the percentage of any other person. Beneficial ownership representing less than 1% is denoted with an asterisk (*). The address of named beneficial owners that are officers and/or directors of the Company is: c/o 22nd Century Group, Inc., 500 Seneca Street, Suite 507, Buffalo, New York 14204. The following table is based upon information supplied by officers and directors, and with respect to 5% or greater stockholders who are not officers or directors, information filed with the SEC.

Name of Beneficial Owner	Number of Shares Beneficially Owned	Percentage Beneficially Owned (1)
Officers and Directors:		
James A. Mish (2)	305,070	*
R. Hugh Kinsman	52,327	*
John Franzino (3)	139,690	*
John Miller (4)	75,000	*
Nora B. Sullivan (5) (7)	950,431	*
Richard M. Sanders (6) (7)	596,068	*
Clifford B. Fleet (7)	256,195	*
Roger D. O'Brien (7)	308,595	*
Michael Koganov (7)	179,372	*
Anthony Johnson (7)	91,808	*
Lucille Salhany(8)	27,612	*
All directors, director nominees and executive officers as a group (11 persons) (2) - (8)	2,982,168	1.40%

(1) Based on 215,704,036 shares of common stock issued and outstanding as of March 1, 2023.
(2) 1,681,730 restricted stock units are not included in the number of beneficially owned shares because they do not vest within 60 days of March 1, 2023.
(3) 265,884 restricted stock units are not included in the number of beneficially owned shares because they do not vest within 60 days of March 1, 2023.
(4) Excludes 750,000 performance shares, with one-third of such shares vesting on each of May 1, 2023, 2024 and 2025 provided that the Company's tobacco business plan revenue objectives and other performance requirements are satisfied at such times.
(5) Consists of (a) 748,707 shares of common stock held directly and (b) 201,724 shares of common stock issuable upon exercise of stock options.
(6) Consists of (a) 444,344 shares of common stock held directly and (b) 151,724 shares of common stock issuable upon exercise of stock options.
(7) Includes 51,808 restricted stock units vesting on March 21, 2023, subject to continued service.
(8) Consists of restricted stock units vesting on March 21, 2023, subject to continued service.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

Related Party Transactions

Our policy is to enter into transactions with related persons on terms that, on the whole, are no less favorable to us than those available from unaffiliated third parties. Our Board of Directors has adopted written policies and procedures regarding related person transactions. For purposes of these policies and procedures:

- A "related person" means any of our directors, executive officers, nominees for director, holder of 5% or more of our common stock or any of their immediate family members; and
- A "related person transaction" generally is a transaction (including any indebtedness or a guarantee of indebtedness) in which we were or are to be a participant and the amount involved exceeds $120,000 and in which a related person had or will have a direct or indirect material interest.

Each of our executive officers, directors or nominees for director is required to disclose to our Audit Committee certain information relating to related person transactions for review, approval or ratification by our Audit Committee. In making a determination about approval or ratification of a related person transaction, our Audit Committee will consider the information provided regarding the related person transaction and whether consummation of the transaction is believed by the Audit Committee to be in our best interests. Our Audit Committee may take into account the effect of a director's related person transaction on the director's status as in independent member of our Board of Directors and eligibility to serve on committees of our Board under SEC rules and the listing standards of the Nasdaq Stock Market. Any related person transaction must be disclosed to our full Board of Directors. There were no related party transactions in 2022 and 2021.

Independent Directors

Our Board of Directors has determined that Anthony Johnson, Dr. Michael Koganov, Roger D. O'Brien, Lucille S. Salhany, Richard M. Sanders and Nora B. Sullivan are "independent" as defined by applicable Nasdaq Stock Market listing standards. The Board annually reviews all business and other relationships of directors and determines whether directors meet these categorical independence tests. In addition, each member of our Audit Committee, Compensation Committee, and Corporate Governance and Nominating Committee is "independent" as defined by applicable Nasdaq Stock Market listing standards and applicable SEC rules for service on such committee.

Item 14. Principal Accounting Fees and Services.

The following table shows the fees billed to us for the audits and other services provided by Freed Maxick CPAs, P.C. ("Freed"), our independent registered certified public accounting firm, for the fiscal years ended December 31, 2022 and 2021, respectively.

	2022	2021
Audit fees	$ 430,100	$ 312,275
Audit-related fees	—	—
Tax fees	—	—
All other fees	—	—
	$ 430,100	$ 312,275

Audit Fees consist of the aggregate fees billed for professional services rendered for the audit of our consolidated annual financial statements and the quarterly reviews of financial statements and for any other services that are normally provided by our independent registered public accountants in connection with our statutory and regulatory filings or engagements.

Audit Committee Policies and Procedures For Pre-Approval of Independent Auditor Services

The Audit Committee, in accordance with its charter, must pre-approve all non-audit services provided by our independent registered public accountants. The Audit Committee generally pre-approves specified series in the defined categories of audit services, audit related services and tax services up to specified amounts. Pre-approval may also be given as part of our Audit Committee's approval of the scope of the engagement of the independent registered public accountants or on an individual, explicit case-by-case basis before the independent auditor is engaged to provide each service.

The Audit Committee has considered whether the provision of the services not related to the audit of the financial statements acknowledged in the table above was compatible with maintaining the independence of Freed and is of the opinion that the provision of these services was compatible with maintaining Freed's independence.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

(a) (1) Financial Statements

(a) (2) Financial Statement Schedules

Financial statement schedules have been omitted because they are not required.

(b) Exhibits

Exhibits required by Item 601 of Regulation S-K are listed in the Exhibit Index below following the Financial Statements, which are incorporated herein by this reference.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of 22nd Century Group, Inc.

Opinion on the Financial Statements
We have audited the accompanying consolidated balance sheets of 22nd Century Group, Inc. and subsidiaries (the Company) as of December 31, 2022 and 2021, the related consolidated statements of operations and comprehensive loss, changes in shareholders' equity and cash flows for each of the two years in the period ended December 31, 2022, and the related notes to the consolidated financial statements (collectively, the financial statements). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion
These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters
The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Business acquisition
Critical Audit Matter Description

As discussed in Note 2 of the consolidated financial statements, during the year ended December 31, 2022, the Company completed a business acquisition of GVB Biopharma (GVB) for an aggregate purchase price of approximately $53 million. As discussed in Note 1 of the consolidated financial statements, the Company applies the acquisition method of accounting for business combinations. Under this method, identifiable assets acquired, liabilities assumed, and consideration transferred are measured at their acquisition-date fair value. Any purchase price in excess of the net assets is recorded as goodwill. As discussed in Note 2 to the consolidated financial statements, various assumptions that require management's judgement were used to determine the fair value of the assets acquired.

The judgments made in the determination of the estimated fair values assigned to the assets acquired and the liabilities assumed, as well as the estimated useful life of certain assets and liabilities, can materially impact the financial statements in the current period, as well as periods after acquisition. Due to the subjectivity involved we identified the fair value estimate of assets acquired as a critical audit matter, which required a higher degree of auditor judgement as well as the use of professionals with specialized skill and knowledge.

How the Critical Audit Matter Was Addressed in the Audit

Addressing the matter involved performing subjective procedures and evaluating audit evidence in connection with forming our overall opinion on the financial statements. The primary procedures we performed include: obtaining an understanding of the process and implemented controls as it relates to the determination of the fair value of assets acquired; identifying key inputs and assumptions used by management to estimate the fair values of the assets purchased; and testing the completeness and accuracy of source information used, mathematical accuracy of management's calculations, and reviewing assumptions for reasonableness.

Impairment tests for indefinite-lived intangible assets and goodwill
Critical Audit Matter Description

As discussed in Note 1 of the consolidated financial statements, indefinite-lived intangible assets and goodwill are tested for impairment at least annually or more frequently if events or changes in circumstances indicate that it is more likely than not that an impairment exists. As discussed in Notes 6 and 19, the GVB fire, as well as shifts in strategy and changes in expected cash flows resulted in changes in circumstances captured in the annual impairment tests of the tradename and goodwill. As discussed in Notes 1 and 8 to the consolidated financial statements, various assumptions that require management's judgement were used to determine the fair value of the tradename and goodwill.

The judgments made in the determination of the estimated fair values assigned to the asset and reporting unit can materially impact the financial statements. Due to the subjectivity involved we identified the fair value estimate of the assets and reporting unit tested for impairment as a critical audit matter, which required a higher degree of auditor judgement as well as the use of professionals with specialized skill and knowledge.

How the Critical Audit Matter Was Addressed in the Audit
Addressing the matter involved performing subjective procedures and evaluating audit evidence in connection with forming our overall opinion on the financial statements. The primary procedures we performed include: obtaining an understanding of the process and implemented controls as it relates to management's impairment analysis; identifying key inputs and assumptions used by management to estimate the fair values; and testing the completeness and accuracy of source information used, mathematical accuracy of management's calculations, and reviewing assumptions for reasonableness.

/s/ Freed Maxick, CPAs, P.C.

We have served as the Company's auditor since 2011.

Buffalo, New York
March 9, 2023

22nd CENTURY GROUP, INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(amounts in thousands, except share and per-share data)

	December 31, 2022	December 31, 2021
ASSETS		
Current assets:		
Cash and cash equivalents	$ 3,020	$ 1,336
Short-term investment securities	18,193	47,400
Accounts receivable, net	5,641	585
Inventories	10,008	2,881
Insurance recoveries	5,000	—
Prepaid expenses and other current assets	2,743	2,183
Total current assets	44,605	54,385
Property, plant and equipment, net	13,093	5,841
Operating lease right-of-use assets, net	2,675	1,723
Goodwill	33,160	—
Intangible assets, net	16,853	7,919
Investments	682	2,345
Other assets	3,583	3,741
Total assets	$ 114,651	$ 75,954
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Notes and loans payable - current	$ 908	$ 596
Operating lease obligations	681	308
Accounts payable	4,168	2,173
Accrued expenses	1,428	1,489
Accrued payroll	3,199	2,255
Accrued excise taxes and fees	1,423	1,270
Deferred income	831	119
Other current liabilities	380	217
Total current liabilities	13,018	8,427
Long-term liabilities:		
Notes and loans payable	3,001	—
Operating lease obligations	2,141	1,432
Other long-term liabilities	516	21
Total liabilities	18,676	9,880
Commitments and contingencies (Note 12)		
Shareholders' equity		
Preferred stock, $.00001 par value, 10,000,000 shares authorized		
Common stock, $.00001 par value, 300,000,000 shares authorized		
Capital stock issued and outstanding:		
215,238,198 common shares (162,872,875 at December 31, 2021)		
Common stock, par value	2	2
Capital in excess of par value	333,898	244,247
Accumulated other comprehensive loss	(111)	(162)
Accumulated deficit	(237,814)	(178,013)
Total shareholders' equity	95,975	66,074
Total liabilities and shareholders' equity	$ 114,651	$ 75,954

See accompanying notes to consolidated financial statements.

22nd CENTURY GROUP, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS
(amounts in thousands, except per-share data)

	Year Ended December 31,	
	2022	2021
Revenues, net	$ 62,111	$ 30,948
Cost of goods sold	60,937	29,462
Gross profit	1,174	1,486
Operating expenses:		
Sales, general and administrative	44,517	25,908
Research and development	6,561	3,912
Other operating expense, net	7,202	78
Total operating expenses	58,280	29,898
Operating loss	(57,106)	(28,412)
Other income (expense):		
Unrealized loss on investments	(5)	(6,994)
Realized (loss) gain on Panacea investment	(2,789)	2,548
Realized loss on short-term investment securities	(366)	—
Other income, net	71	—
Interest income, net	313	321
Interest expense	(353)	(58)
Total other expense	(3,129)	(4,183)
Loss before income taxes	(60,235)	(32,595)
(Benefit) provision for income taxes	(434)	14
Net loss	$ (59,801)	$ (32,609)
Net loss per common share - basic and diluted	$ (0.31)	$ (0.21)
Weighted average common shares outstanding - basic and diluted (in thousands)	$ 192,837	$ 156,208
Net loss	$ (59,801)	$ (32,609)
Other comprehensive loss:		
Unrealized loss on short-term investment securities	(316)	(236)
Foreign currency translation	1	—
Reclassification of realized losses to net loss	366	—
Other comprehensive income (loss)	51	(236)
Comprehensive loss	$ (59,750)	$ (32,845)

See accompanying notes to consolidated financial statements.

22nd CENTURY GROUP, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY
(amounts in thousands, except share amounts)

	Years Ended December 31, 2022 and 2021					
	Common Shares Outstanding	Par Value of Common Shares	Capital in Excess of Par Value	Other Comprehensive Income (Loss)	Accumulated Deficit	Shareholders' Equity
Balance at January 1, 2021	**139,061,690**	**$ 1**	**$ 189,439**	**$ 74**	**$ (145,404)**	**$ 44,110**
Stock issued in connection with warrant exercises	11,293,211	1	11,781	—	—	11,782
Stock issued in connection with option exercises	983,613	—	1,307	—	—	1,307
Stock issued in connection with RSU vesting, net of shares withheld for taxes	1,534,361	—	(469)	—	—	(469)
Stock issued in connection with capital raise	10,000,000	—	38,206	—	—	38,206
Equity-based compensation	—	—	3,983	—	—	3,983
Other comprehensive loss	—	—	—	(236)	—	(236)
Net loss	—	—	—	—	(32,609)	(32,609)
Balance at December 31, 2021	**162,872,875**	**$ 2**	**$ 244,247**	**$ (162)**	**$ (178,013)**	**$ 66,074**
Stock issued in connection with option exercises	150,000	—	174	—	—	174
Stock issued in connection with RSU vesting, net of shares withheld for taxes	2,242,148	—	(149)	—	—	(149)
Stock issued in connection with acquisition	32,900,000	—	51,653	—	—	51,653
Stock issued in connection with capital raise, net of issuance costs of 2,516	17,073,175	—	32,484	—	—	32,484
Equity-based compensation	—	—	5,489	—	—	5,489
Other comprehensive income	—	—	—	51	—	51
Net loss	—	—	—	—	(59,801)	(59,801)
Balance at December 31, 2022	**215,238,198**	**$ 2**	**$ 333,898**	**$ (111)**	**$ (237,814)**	**$ 95,975**

See accompanying notes to consolidated financial statements.

22nd CENTURY GROUP, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

(amounts in thousands)

	Year Ended December 31,	
	2022	**2021**
Cash flows from operating activities:		
Net loss	$ (59,801)	$ (32,609)
Adjustments to reconcile net loss to cash used in operating activities:		
Impairment of intangible assets	1,488	78
Amortization and depreciation	2,858	1,248
Amortization of right-of-use asset	733	288
Amortization of inventory step-up	978	—
Unrealized loss on investment	5	6,994
GVB fire write-offs	4,549	—
Realized loss on short-term investment securities	366	—
Change in allowance for doubtful accounts	770	—
Gain on the sale of machinery and equipment	(368)	—
Realized loss (gain) on Panacea investment	2,789	(2,548)
Accretion of non-cash interest expense (income), net	197	143
Equity-based employee compensation expense	5,489	3,983
Deferred income taxes	(434)	—
Inventory write-off	237	317
Changes in operating assets and liabilities, net of acquisition:		
Accounts receivable	(2,881)	1,574
Inventory	(8,789)	(1,164)
Prepaid expenses and other assets	(920)	(547)
Accounts payable	416	11
Accrued expenses	(582)	533
Accrued payroll	748	47
Accrued excise taxes and fees	153	(421)
Other liabilities	285	(766)
Net cash used in operating activities	(51,714)	(22,839)
Cash flows from investing activities:		
Acquisition of patents, trademarks, and licenses	(772)	(326)
Acquisition of property, plant and equipment	(3,657)	(745)
Proceeds from the sale of machinery and equipment	409	—
Acquisition, net of cash acquired and debt assumed	(1,297)	—
Investment in Change Agronomy Ltd.	(682)	—
Sales and maturities of short-term investment securities	101,990	63,749
Purchase of short-term investment securities	(73,413)	(90,407)
Net cash provided by (used in) investing activities	22,578	(27,729)
Cash flows from financing activities:		
Payment on note payable	(3,822)	(2,604)
Proceeds from note payable issuance	2,162	2,653
Other financing activities	(29)	—
Net proceeds from option exercise	174	1,307
Net proceeds from warrant exercise	—	11,782
Proceeds from issuance of common stock	35,000	40,000
Payment of common stock issuance costs	(2,516)	(1,794)
Taxes paid related to net share settlement of RSUs	(149)	(469)
Net cash provided by financing activities	30,820	50,875
Net increase in cash and cash equivalents	1,684	307
Cash and cash equivalents - beginning of period	1,336	1,029
Cash and cash equivalents - end of period	$ 3,020	$ 1,336
Supplemental disclosures of cash flow information:		
Net cash paid for:		
Cash paid during the period for interest	$ 34	$ 37
Cash paid during the period for income taxes	$ 14	$ —
Non-cash transactions:		
Capital expenditures incurred but not yet paid	$ 94	$ 1,074
Right-of-use assets and corresponding operating lease obligations	$ —	$ 1,816
Panacea investment conversion	$ —	$ 12,485
Stock issued in connection with acquisition	$ 51,653	$ —

See accompanying notes to consolidated financial statements.

22nd CENTURY GROUP, INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
December 31, 2022
Amounts in thousands, except for share and per share data

NOTE 1. – SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

22nd Century Group, Inc. (together with its consolidated subsidiaries, "22nd Century Group" or the "Company") is a publicly traded Nevada corporation on the NASDAQ Capital Market under the symbol "XXII." 22nd Century Group is a leading agricultural biotechnology and intellectual property company focused on tobacco harm reduction, reduced nicotine tobacco and improving health and wellness through plant science.

Basis of Presentation and Principles of Consolidation – The consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America ("GAAP") and include the accounts of 22nd Century Group and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

As described in Note 2, on May 13, 2022, the Company acquired substantially all of the assets of GVB Biopharma's ("GVB") business dedicated to hemp-based cannabinoid extraction, refinement, contract manufacturing and product development, which allows the Company to leverage its expertise in receptor and plant science to develop its hemp/cannabis franchise.

As a result of the acquisition of GVB and ongoing evaluation of the Company's strategy across our plant science and intellectual property platform, the Company reevaluated its operating and reporting segments, which was finalized during the fourth quarter of 2022. The Company now organizes its business into two reportable segments: (1) Tobacco and (2) Hemp/cannabis. This segment structure reflects the financial information and reports used by the Company's management, specifically its Chief Operating Decision Maker ("CODM"), to make decisions regarding the Company's business, including resource allocations and performance assessments. This segment structure reflects the Company's current operating focus in compliance with Accounting Standards Codification ("ASC") 280, *Segment Reporting*. As a result of the new segment reporting structure, the Company has reclassified prior year amounts to conform them to the current year presentation. The revised segment structure and the related presentation changes did not impact consolidated net loss, earnings (loss) per share, total current assets, total assets or total stockholders' equity. Refer to Note 17 "Segment and Geographic Information," for additional information on the Company's reportable segments.

Use of Estimates – The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of income and expenses during the reporting period. Actual results could differ from those estimates.

Reclassifications – As a result of the acquisition of GVB (see Note 2), the Company has revised the presentation and classification of depreciation and amortization in the Consolidated Statement of Operations and Comprehensive Loss to conform with the acquiree, as follows:

	Year Ended December 31, 2021		
	As originally reported	Reclass	Revised
Revenues, net	$ 30,948	$ —	$ 30,948
Cost of goods sold	28,879	583	29,462
Gross profit	2,069	(583)	1,486
Operating expenses:			
Sales, general and administrative	25,881	27	25,908
Research and development	3,274	638	3,912
Impairment of intangible assets	78	(78)	—
Other operating expenses, net	—	78	78
Depreciation	633	(633)	—
Amortization	615	(615)	—
Total operating expenses	30,481	(583)	29,898
Operating loss	$ (28,412)	$ —	$ (28,412)

Preferred stock authorized – The Company is authorized to issue "blank check" preferred stock, which could be issued with voting, liquidation, dividend and other rights superior to our common stock.

Foreign currency translation– The functional currency of our foreign subsidiaries is generally the respective local currency. The translation from the applicable foreign currencies to U.S. dollars is performed for balance sheet accounts using period-end rates of exchange and for revenue and expense accounts using an average rate of exchange during the period. The resulting translation adjustments are recognized as a component of Accumulated other comprehensive loss. Gains or losses resulting from foreign currency denominated transactions are included in Other income (expense) in the Consolidated Statement of Operations and Comprehensive Loss.

Concentration of Credit Risk – Financial instruments that potentially subject the Company to concentration of credit risk consist of cash accounts in financial institutions. Although the cash accounts exceed the federally insured deposit amount, management does not anticipate nonperformance by the financial institutions. Management reviews the financial viability of these institutions on a periodic basis.

Cash and cash equivalents – The Company considers all highly liquid investments with maturities of three months or less at the date of acquisition to be cash equivalents. However, the Company has elected to classify money market mutual funds related to its short-term investment portfolio as short-term investment securities. There are no restrictions on the Company's cash and cash equivalents.

Short-term investment securities – The Company's short-term investment securities are classified as available-for-sale securities and consist of money market funds, corporate bonds, U.S. government agency bonds, U.S. treasury securities, and commercial paper with maturities that may extend beyond three months at the time of acquisition. The Company's short-term investment securities are carried at fair value within current assets on the Company's Consolidated Balance Sheets. The Company views its available-for-sale securities as available for use in current operations regardless of the stated maturity date of the security. The Company's investment policy states that all investment securities must have a maximum maturity of twenty-four (24) months or less and the maximum weighted maturity of the investment securities must not exceed twelve (12) months. Some of the Company's short-term investment securities are fixed-income debt instruments, and accordingly, unrealized gains and losses incurred on the short-term investment securities (the adjustment to fair value) are recorded in other comprehensive income or loss on the Company's Consolidated Statements of Operations and Comprehensive Loss. Realized gains and losses on short-term investment securities are recorded in the other income (expense) portion of the Company's Consolidated Statements of Operations and Comprehensive Loss. Interest income is recorded on the accrual basis and presented net of investment related fees.

Accounts receivable, net – The Company extends credit to customers in the normal course of business. Trade accounts receivable are recorded at their invoiced amounts, net of allowance for doubtful accounts. The Company periodically reviews aged account balances for collectability. The Company recorded an allowance for doubtful accounts of $372 and $0 for years ended December 31, 2022 and December 31, 2021.

Inventories – Inventories are valued at the lower of historical cost or net realizable value. Cost is determined using an average cost method for tobacco leaf inventory and raw materials inventory. Standard cost is primarily used for finished goods inventory. Cost of hemp biomass consists of initial third-party acquisition costs plus analytical testing costs. Costs of extracted and hemp oil inventory are comprised of initial acquisition cost of the biomass and all direct and indirect processing costs including labor related costs, consumables, materials, packaging supplies, utilities, facility costs, analytical testing costs, and production related depreciation. Inventories are evaluated to determine whether any amounts are not recoverable based on slow moving or obsolete condition and are written off or reserved as appropriate.

Property, plant and equipment – Plant and equipment are recorded at their acquisition cost and depreciated on a straight-line basis over their estimated useful lives. Leasehold improvements are depreciated on a straight-line basis over the term of the lease or the estimate useful life of the asset, whichever is shorter. Depreciation commences when the asset is placed in service. The following table shows estimated useful lives of property, plant and equipment:

Classification	Estimated Useful Lives
Buildings	25 to 40 years
Laboratory equipment	5 years
Land improvements	15 years
Leasehold improvements	shorter of 20 years or lease term
Manufacturing equipment	5 to 15 years
Office furniture, fixtures and equipment	3 to 10 years
Vehicles	5 years

Acquisitions - The Company accounts for acquisitions under the acquisition method of accounting for business combinations. Results of operations of acquired companies are included in the Company's results of operations as of the respective acquisition dates. The purchase price of each acquisition is allocated to the net assets acquired based on estimates of their fair values at the date of the acquisition. Any purchase price in excess of these net assets is recorded as goodwill. The allocation of purchase price in certain cases may be subject to revision based on the final determination of fair values during the measurement period, which may be up to one year from the acquisition date.

All direct acquisition-related costs are expensed as incurred and are recognized in Other operating expenses, net on the Company's Consolidated Statements of Operations and Comprehensive Loss.

Goodwill - Goodwill represents the excess of cost over the fair value of identifiable net assets of a business acquired and is assigned to one or more reporting units. The Company's reporting units are the same as its reportable segments, Tobacco and Hemp/cannabis. The Company tests its reporting unit's goodwill for impairment at least annually as of the measurement date and between annual tests if an event occurs or circumstances change that would more-likely-than-not reduce the fair value of a reporting unit below its carrying amount.

In conducting its goodwill test, the Company either performs a qualitative assessment or a quantitative assessment. A qualitative assessment requires that the Company consider events or circumstances including, but not limited to, macro-economic conditions, market and industry conditions, cost factors, competitive environment, changes in strategy, changes in customers, changes in the Company's stock price, results of the last impairment test, and the operational stability and the overall financial performance of the reporting units. If, after assessing the totality of events or circumstances, the Company determines that it is more likely than not that the fair values of its reporting units are greater than the carrying amounts, then the quantitative goodwill impairment test is not performed. The Company may elect to bypass the qualitative analysis and perform a quantitative analysis.

If the qualitative assessment indicates that the quantitative analysis should be performed or if management elects to bypass a qualitative analysis to perform a quantitative analysis, the Company then evaluates goodwill for impairment by comparing the fair value of each of its reporting units to its carrying value, including the associated goodwill. To determine the fair values, the Company uses a weighted combination of the market approach based on comparable publicly traded companies and the income approach based on estimated discounted future cash flows. The cash flow assumptions consider historical and forecasted revenue, operating costs and other relevant factors.

The Company completed its annual goodwill impairment test as of December 1, 2022 and determined, after performing a quantitative assessment of its Hemp/cannabis reporting unit, the fair value of the Hemp/cannabis reporting unit exceeded its carrying amount.

Intangible Assets – Intangible assets recorded at fair value as a component of purchase accounting consist of purchased customer relationships and tradename. Definite lived intangible assets related to customer relationship is amortized on an accelerated basis, which approximates the projected cash flows used to determine the fair value of the definite-lived intangible asset at the time of acquisition. The tradename asset is considered indefinite-lived and is not amortized.

Other definite lived intangible assets are recorded at cost and consist primarily of (1) expenditures incurred with third-parties related to the processing of patent claims and trademarks with government authorities, as well as costs to acquire patent rights from third-parties, (2) license fees paid for third-party intellectual property, (3) costs to become a signatory under the tobacco MSA, and (4) license fees paid to acquire a predicate cigarette brand. The amounts capitalized relate to intellectual property that the Company owns or to which it has rights to use.

The Company's capitalized intellectual property costs are amortized using the straight-line method over the remaining statutory life of the patent assets in each of the Company's patent families, which have estimated expiration dates ranging from 2026 to 2043. Periodic maintenance or renewal fees are expensed as incurred. Annual minimum license fees are charged to expense. License fees paid for third-party intellectual property are amortized on a straight-line basis over the last to expire patents, which have expected expiration dates from 2028 through 2036. The Company believes that costs associated with becoming a signatory to the MSA, costs related to the acquisition of a predicate cigarette brand and trademarks have indefinite lives. As such, no amortization is taken. At each reporting period, the Company evaluates whether events and circumstances continue to support the indefinite-lived classification.

Impairment of Long-Lived Assets – The Company reviews the carrying value of its amortizing long-lived assets whenever events or changes in circumstances indicate that the historical cost-carrying value of an asset may no longer be recoverable. On at least an annual basis, the Company assesses whether events or changes in circumstances indicate that the carrying amount may not be recoverable. If any such indicators are present, the Company will test for recoverability in accordance with ASC 360-*Property, plant, and equipment* or ASC 350- *Intangibles, Goodwill, and Other*.

Intangible assets subject to amortization are reviewed for strategic importance and commercialization opportunity prior to expiration. If it is determined that the asset no longer supports the Company's strategic objectives and/or will not be commercially viable prior to expiration, the asset is impaired. In addition, the Company will assess the expected future undiscounted cash flows for its intellectual property based on consideration of future market and economic conditions, competition, federal and state regulations, and licensing opportunities. If the carrying value of such assets are not recoverable, the carrying value will be reduced to fair value and record the difference as an impairment.

Indefinite-lived intangible asset carrying values are reviewed at least annually or more frequently if events or changes in circumstances indicate that it is more likely than not that an impairment exists. The Company first performs a qualitative assessment and considers its current strategic objectives, future market and economic conditions, competition, and federal and state regulations to determine if an impairment is more likely than not. If it is determined that an impairment is more likely than not, a quantitative assessment is performed to compare the asset carrying value to fair value.

The Company completed its annual impairment test as of December 1, 2022 of indefinite lived intangible assets and determined, after performing a quantitative assessment using the relief from royalty method, the fair value was below its carrying amount and accordingly recorded an impairment charge.

Refer to Note 6 “Goodwill and Other Intangible Assets, Net” for further details of the Company’s goodwill and other intangible assets and Note 8 “Fair Value Measurements” for further details of the inputs and assumptions utilized in managements quantitative assessment of indefinite lived intangible assets.

Leases – The Company determines if an arrangement is, or contains, a lease at inception and classifies it as operating or finance. The Company has operating and finance leases for office and manufacturing facilities, machinery and vehicles. Finance lease assets and corresponding liabilities are not material to the consolidated financial statements.

Any operating lease having a lease term greater than twelve months will be recognized on the Consolidated Balance Sheets as a right-of-use (ROU) asset with an associated lease obligation—all other leases are considered short-term in nature and will be expensed on a month-to-month basis. The ROU assets and lease obligations are recognized as of the commencement date at the net present value of the fixed minimum lease payments for the lease term. The lease term is determined based on the contractual conditions, including whether renewal options are reasonably certain to be exercised. The discount rate used is the interest rate implicit in the lease, if available, or the Company’s incremental borrowing rate which is determined using a base line rate plus an applicable spread.

Refer to Note 5 for additional information regarding our ROU assets and liabilities.

Income Taxes – The Company recognizes deferred tax assets and liabilities for any basis differences in its assets and liabilities between tax and U.S. GAAP reporting, and for operating loss and credit carry-forwards.

As a result of the Company’s history of cumulative net operating losses and the uncertainty of their future utilization, the Company has established a valuation allowance to fully offset its net deferred tax assets as of December 31, 2022 and December 31, 2021. Additionally, the Company has elected to present other comprehensive income items relating to net unrealized gains on short-term investment securities gross and not net of taxes.

The Company’s federal and state tax returns for the years ended December 31, 2019 through December 31, 2021 are currently open to audit under the statutes of limitations. There are no pending audits as of December 31, 2022.

Stock Based Compensation – The Company’s Omnibus Incentive Plan allows for various types of equity-based incentive awards. Stock based compensation expense is based on awards that are expected to vest over the requisite service periods and are based on the fair value of the award measured on the grant date. Vesting requirements vary for directors, officers, and employees. In general, time-based awards fully vest after one year for directors and vest in equal annual installments over a three-year period for officers and employees. Performance-based awards vest upon achievement of certain milestones. Forfeitures are accounted for when they occur.

Revenue Recognition – The Company recognizes revenue when it satisfies a performance obligation by transferring control of the product to a customer. For additional discussion on revenue recognition, refer to Note 18.

Fair Value of Financial Instruments – FASB ASC 820 - *Fair Value Measurements and Disclosures* establishes a valuation hierarchy for disclosure of the inputs to valuation used to measure fair value. This hierarchy prioritizes the inputs into three broad levels as follows:

- Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets or liabilities;
- Level 2 inputs are quoted prices for similar assets and liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument; and
- Level 3 inputs are unobservable inputs based on the Company’s own assumptions used to measure assets and liabilities at fair value.

A financial asset's or a financial liability's classification within the hierarchy is determined based on the lowest level input that is significant to the fair value measurement. The Company estimates that the carrying amounts reported on the Consolidated Balance Sheets for cash and cash equivalents, accounts receivable, contract assets, promissory note receivable, accounts payable and accrued expenses, and notes and loans payable approximate their fair value due to the short-term nature of these items. Note 8 contains additional information on assets and liabilities recorded at fair value in the Consolidated Financial Statements.

Investments –The Company's equity securities are recorded at fair value with changes in fair value included within the statement of operations. Equity securities without a readily determinable market value are carried at cost less impairment, adjusted for observable price changes in orderly transactions for an identical or similar investment of the same issuer. The Company considers certain debt instruments as available-for-sale securities, and accordingly, all unrealized gains and losses incurred on the short-term investment securities (the adjustment to fair value) are recorded in other comprehensive income or loss on the Company's Consolidated Statements of Operations and Comprehensive Loss.

Research and Development – Research and development costs are expensed as incurred.

Loss Per Common Share – Basic loss per common share is computed using the weighted-average number of common shares outstanding. Diluted loss per share is computed assuming conversion of all potentially dilutive securities. Potential common shares outstanding are excluded from the computation if their effect is anti-dilutive. Refer to Note 13 for additional information.

Gain and Loss Contingencies – The Company establishes an accrued liability for litigation and regulatory matters when those matters present loss contingencies that are both probable and estimable. In such cases, there may be an exposure to loss in excess of any amounts accrued. When a loss contingency is not both probable and estimable, the Company does not establish an accrued liability. As a litigation or regulatory matter develops, the Company, in conjunction with any outside counsel handling the matter, evaluates on an ongoing basis whether such matter presents a loss contingency that is probable and estimable. If, at the time of evaluation, the loss contingency related to a litigation or regulatory matter is not both probable and estimable, the matter will continue to be monitored for further developments that would make such loss contingency both probable and estimable. When a loss contingency related to a litigation or regulatory matter is deemed to be both probable and estimable, the Company will establish an accrued liability with respect to such loss contingency and record a corresponding amount of related expenses. The Company will then continue to monitor the matter for further developments that could affect the amount of any such accrued liability.

The Company maintains general liability insurance policies for its facilities. Under the terms of our insurance policies, in the case of loss to a property, the Company follows the guidance in ASC 610-30, *Other Income —Gains and Losses on Involuntary Conversions,* for the conversion of nonmonetary assets (the properties) to monetary assets (insurance recoveries). Under ASC 610-30, once the recovery is deemed probable the Company recognizes an asset for the insurance recovery receivable in the Consolidated Balance Sheets, with corresponding income that is offsetting to the casualty losses recorded in the Consolidated Statements of Operations and Comprehensive Loss. If the insurance recovery is less than the amount of the casualty charges recognized, the Company will recognize a loss whereas if the insurance recovery is greater than the amount of casualty loss recognized, the Company will only recognize a recovery up to the amount of the casualty loss and will account for the excess as a gain contingency in accordance with ASC 450-30, *Gain Contingencies.* Business interruption insurance is treated as a gain contingency. Gain contingencies are recognized when earned and realized, which typically will occur at the time of final settlement or when cash is received.

Refer to further discussion of all commitments and contingencies in Note 12.

Severance charges - From time to time, the Company evaluates its resources and optimizes its business plan to align to changing needs of executing on its strategy. These actions may result in voluntary or involuntary employee termination benefits. Voluntary termination benefits are accrued when an employee accepts the related offer. Involuntary termination benefits are accrued upon the commitment to a termination plan and the benefit arrangement is communicated to affected employees, or when liabilities are determined to be probable and estimable, depending on the existence of a substantive plan for severance or termination. The following table summarizes the change in accrued liabilities, presented within Other current liabilities and Other long-term liabilities Consolidated Balance Sheets:

Balance at January 1, 2022	$ 238
Accruals	692
Cash payments	(296)
Balance at December 31, 2022	$ 634

	December 31, 2022	December 31, 2021
Current	$ 349	$ 217
Noncurrent	285	21
Total severance liability	$ 634	$ 238

In addition, during the year ended December 31, 2022, the Company recorded $1,237 of accelerated equity compensation expense in connection with the vesting of an employee's outstanding equity awards as part of the termination severance agreement. Amounts are recorded as Selling, general and administrative in the Consolidated Statements of Operations and Comprehensive Loss.

Recent Accounting Pronouncement(s) – In June 2016, the FASB issued ASU 2016-13, "*Measurement of Credit Losses on Financial Instruments.*" The standard replaces the incurred loss model with the current expected credit loss (CECL) model to estimate credit losses for financial assets measured at amortized cost and certain off-balance sheet credit exposures. The provisions of the ASU have an effective date for the Company beginning after December 15, 2022 and interim periods within those fiscal years.

The standard was effective for the Company on January 1, 2023 and will be adopted using a modified retrospective transition method through a cumulative-effect adjustment to retained earnings. The Company does not expect the new credit loss standard to have a material impact to the Consolidated Financial Statements.

We consider the applicability and impact of all ASUs. If the ASU is not listed above, it was determined that the ASU was either not applicable or would have an immaterial impact on our financial statements and related disclosures.

NOTE 2. – BUSINESS ACQUISITIONS

On May 13, 2022, the Company entered into and closed the transactions contemplated by the Reorganization and Acquisition Agreement (the "Reorganization Agreement") with GVB. Under the terms of the Reorganization Agreement, the Company acquired substantially all of the assets of GVB's business dedicated to hemp-based cannabinoid extraction, refinement, contract manufacturing and product development (the "Transaction"). The acquisition of GVB allows the Company to leverage its expertise in receptor and plant science to develop its hemp/cannabis franchise and add significant scale. GVB is included in the Company's Hemp/cannabis reportable segment.

The aggregate consideration for the Transaction consisted of (i) the assumption of approximately $4,637 of debt, (ii) the assumption and direct payment of certain third-party transaction costs incurred by GVB in connection with the Transaction totaling approximately $1,753 and (iii) the issuance to GVB of 32,900,000 unregistered shares of common stock of the Company (the "Shares") with a fair value of $51,653. The fair value of the Company's common stock issued as part of the consideration was determined based upon the opening stock price of the Company's shares as of the acquisition date. The Shares are subject to a lock-up and restrictions on transfer for at least six months following closing and thereafter, one-third of the Shares will be released from the lock-up after six months, one-third will be released from the lock-up after nine months and the remainder will be released after one year.

The Transaction was structured as a tax-free re-organization pursuant to Internal Revenue Code Section 368(a)(1)(c). Accordingly, the tax basis of net assets acquired retain their carry over tax basis and holding period in purchase accounting.

The Company recorded provisional estimated fair values for the assets purchased, liabilities assumed and purchase consideration as of the date of the acquisition during the second quarter of 2022, resulting in goodwill of $44,200. The determination of estimated fair value required management to make significant estimates and assumptions based on information that was available at the time the Consolidated Financial Statements were prepared.

During the measurement period, the preliminary fair values of the assets acquired and liabilities assumed as of May 13, 2022 were adjusted to reflect the ongoing acquisition valuation analysis procedures of property and equipment, intangible assets, deferred taxes, and working capital adjustments. These adjustments resulted in a combined reduction to goodwill of $11,040. The impact of depreciation and amortization to Operating loss recorded in the third quarter of 2022 as a result of completing valuation procedures for property and equipment and intangible assets, that would have been recorded in the prior period since the date of acquisition was $70.

The amounts reported are considered provisional as the Company is finalizing the valuations that are required to allocate the purchase price through the measurement period, which remains open as of December 31, 2022, as the final stub period income tax returns have not yet been completed. As a result, the allocation of the provisional purchase price may change in the future, which could be material.

The following table presents management's purchase price allocation:

Cash	$	456
Accounts receivable		2,944
Inventory		3,551
Other assets		519
Property, plant & equipment		11,388
Operating leases right-of-use assets, net		1,231
Goodwill		33,161
Tradename		4,600
Customer relationships		5,800
Accounts payable and accrued expenses		(2,777)
Other current liabilities		(944)
Lease liabilities		(1,259)
Auto loans		(387)
Deferred tax liability		(627)
Bridge loan		(4,250)
Fair value of net assets acquired	$	53,406

The fair values of the assets acquired were determined using one of three valuation approaches: market, income or cost. The selection of a particular method for a given asset depended on the reliability of available data and the nature of the asset, among other considerations.

The market approach estimates the value for a subject asset based on available market pricing for comparable assets. The income approach estimates the value for a subject asset based on the present value of cash flows projected to be generated by the asset. The projected cash flows were discounted at a required rate of return that reflects the relative risk of the asset and the time value of money. The projected cash flows for each asset considered multiple factors from the perspective of a marketplace participant including revenue projections from existing customers, attrition trends, tradename life-cycle assumptions, marginal tax rates and expected profit margins giving consideration to historical and expected margins. The cost approach estimates the value for a subject asset based on the cost to replace the asset and reflects the estimated reproduction or replacement cost for the asset, less an allowance for loss in value due to depreciation or obsolescence, with specific consideration given to economic obsolescence if indicated. These fair value measurement approaches are based on significant unobservable inputs, including management estimates and assumptions.

Current Assets and Liabilities

The fair value of current assets and liabilities, excluding inventory, was assumed to approximate their carrying value as of the acquisition date due to the short-term nature of these assets and liabilities.

The fair value of in-process and finished goods inventory acquired was estimated by applying a version of the income approach called the comparable sales method. This approach estimates the fair value of the assets by calculating the potential revenue generated from selling the inventory and subtracting from it the costs related to the completion and sale of that inventory and a reasonable profit allowance for these remaining efforts. Based upon this methodology, the Company recorded the inventory acquired at fair value resulting in an increase in inventory of $978, which was fully amortized in the three month period ended June 30, 2022 in the Consolidated Statement of Operations and Comprehensive Loss.

Property, Plant and Equipment

The fair value of PP&E acquired was estimated by applying the cost approach for personal property and leasehold improvements. The cost approach was applied by developing a replacement cost and adjusting for economic depreciation and obsolescence.

Leases

The Company recognized operating lease liabilities and operating lease right-of-use assets for office and manufacturing facilities in (i) Las Vegas, Nevada (ii) Grass Valley, Oregon (iii) Prineville, Oregon, and (iv) Tygh Valley, Oregon, accordance with ASC 842, *Leases*.

The following table summarizes the Company's discount rate and remaining lease terms as of the acquisition date:

Weighted average remaining lease term in years	3.8
Weighted average discount rate	8.3 %

The Company concluded there were no off-market lease intangibles on the date of acquisition based on an evaluation of market rents per square foot, geographic location and nature of use of the underlying asset, among other considerations.

Intangible assets

The purchase price was allocated to intangible assets as follows:

Definite-lived Intangible Assets	Fair Value Assigned	Weighted Average Amortization Period (Years)	Weighted Average Discount Rate
Customer relationships	$ 5,800	10	23.50%
Tradename	$ 4,600	Indefinite	23.50%

Customer Relationships

Customer relationships represent the estimated fair value of contractual and non-contractual customer relationships GVB had as of the acquisition date. These relationships were valued separately from goodwill at the amount that an independent third party would be willing to pay for these relationships. The fair value of customer relationships was determined using the multi-period excess-earnings method, a form of the income approach. The estimated useful life of the existing customer base was based upon the historical customer annual attrition rate of 20%, as well as management's understanding of the industry and product life cycles.

Tradename

Tradename represents the estimated fair value of GVB's corporate and product names. The acquired tradename was valued separately from goodwill at the amount that an independent third party would be willing to pay for use of these names. The fair value of the tradename was determined by utilizing the relief from royalty method, a form of the income approach, with a royalty rate of 1.0%. The GVB tradename was assumed to have an indefinite useful life based upon long-term management expectations and future operating plans.

Deferred Taxes

The Company determined the deferred tax position to be recorded at the time of the GVB acquisition in accordance with ASC Topic 740, *Income Taxes*, resulting in recognition of deferred tax liabilities for future reversing of taxable temporary differences primarily for intangible assets and property, plant and equipment. This resulted in a preliminary net deferred tax liability of $627, which includes the carryover basis of historical recognized deferred tax assets, liabilities and valuation allowance.

The net deferred tax liabilities recorded as a result of the acquisition of GVB was determined by the Company to also provide future taxable temporary differences that allow for the Company to utilize certain previously fully reserved deferred tax assets. Accordingly, the Company recognized a reduction to its valuation allowance resulting in a net tax benefit of approximately $434 for the year ended December 31, 2022.

Goodwill

The excess of the purchase price over the fair value of net tangible and intangible assets acquired and liabilities assumed was allocated to goodwill. A variety of factors contributed to the goodwill recognized, including the value of GVB's assembled work force, the incremental value resulting from GVB's capabilities in hemp/cannabis, operational synergies across the plant science platform, and the expected revenue growth over time that is attributable to increased market share from future products and customers. Goodwill recorded in the transaction will be non-deductible.

Actual and Pro Forma (unaudited) disclosures

The results of operations and assets from the GVB acquisition have been included in the Company's consolidated financial statements since the acquisition date. For the year ended December 31, 2022, net revenues related to GVB were $21,610, and net loss was $14,771.

The following unaudited pro forma information presents the consolidated results of operations of the Company and assumes the acquisition occurred on January 1, 2021:

	Three Months Ended December 31,		Year Ended December 31,	
	2022	2021	2022	2021
	(in thousands, except for per-share data)			
Revenues, net	$ 19,482	$ 16,724	$ 73,112	$ 60,374
Net loss	$ (25,629)	$ (11,259)	$ (59,710)	$ (31,848)
Net loss per common share - basic and diluted	$ (0.12)	$ (0.06)	$ (0.29)	$ (0.17)
Weighted average common shares outstanding - basic and diluted	215,293	195,668	204,825	189,108

The unaudited pro forma results are presented for illustrative purposes only and do not reflect the realization of potential cost savings, and any related integration costs. Certain costs savings may result from the acquisition; however, there can be no assurance that these cost savings will be achieved. These unaudited pro forma results do not purport to be indicative of the results that would have been obtained, or to be a projection of results that may be obtained in the future. These unaudited pro forma results include certain adjustments, primarily due to amortization expense due to the fair value adjustment of inventory, acquisition related costs and the impact of income taxes on the pro forma adjustments.

Acquisition costs

During the year ended December 31, 2022, direct costs incurred as a result of the acquisition of GVB of $1,046 were expensed as incurred and included in Other operating expenses, net in the Consolidated Statements of Operations and Comprehensive Loss.

NOTE 3. – INVENTORIES

Inventories at December 31, 2022 and 2021 consisted of the following:

	December 31, 2022	December 31, 2021
Raw materials	$ 8,743	$ 2,634
Work in process	441	—
Finished goods	824	247
	$ 10,008	$ 2,881

During the year ended December 31, 2022, the Company wrote off inventory totaling $4,236 ($3,999 related to the GVB fire as discussed in Note 19) which is included within Other operating expenses, net on the Company's Consolidated Statement of Operations and Comprehensive Loss and $281 which is included with Cost of goods sold on the Company's Consolidated Statement of Operations and Comprehensive Loss.

During the year ended December 31, 2021, the Company wrote off inventory totaling $317 which is included within Cost of goods sold on the Company's Consolidated Statement of Operations and Comprehensive Loss.

NOTE 4. – PROPERTY, PLANT AND EQUIPMENT, NET

Property, plant and equipment, net at December 31, 2022 and 2021 consisted of the following:

	December 31, 2022	December 31, 2021
Land	$ 1,665	$ 1,665
Land improvements	167	—
Buildings	331	130
Laboratory equipment	744	198
Leasehold improvements	358	179
Manufacturing equipment	10,469	5,541
Office furniture, fixtures and equipment	557	139
Vehicles	950	—
Construction in progress	3,774	1,289
	19,015	9,141
Less: accumulated depreciation	(5,922)	(3,300)
Property, plant and equipment, net	$ 13,093	$ 5,841

As of December 31, 2022, the Construction in progress balance primarily relates to the ongoing development of the Prineville, Oregon crude extraction facility, anticipated to be placed in service in the first quarter of 2023. As of December 31, 2021, Construction in progress primarily related to tobacco machinery and equipment, which was placed in service during 2022.

Depreciation expense was $2,178 and $633 for the year ended December 31, 2022 and 2021, respectively. Due to the GVB fire in 2022 (see Note 19), total property, plant and equipment write offs amounted to $5,499 which is included within Other operating expenses, net on the Company's Consolidated Statement of Operations and Comprehensive Loss.

NOTE 5. – RIGHT-OF-USE ASSETS, LEASE OBLIGATIONS, AND OTHER LEASES

The Company leases office space, laboratory space and manufacturing facilities in (i) Mocksville, North Carolina, (ii) Buffalo, New York, (iii) Rockville, Maryland, (iv) Las Vegas, Nevada, (v) Prineville, Oregon, and (vi) multiple locations in Madras, Oregon.

The following table summarized the Company's discount rate and remaining lease terms as of December 31, 2022:

Weighted average remaining lease term in years	6.8
Weighted average discount rate	6.1 %

Future minimum lease payments as of December 31, 2022 are as follows:

2023	$ 835
2024	706
2025	676
2026	219
2027	195
Thereafter	1,142
Total lease payments	3,773
Less: imputed interest	(951)
Present value of lease liabilities	2,823
Less: current portion of lease liabilities	(681)
Total long-term lease liabilities	$ 2,141

Operating lease costs for the year ended December 31, 2022 and 2021, were $891 and $301, respectively.

Supplemental cash flow information for leases for fiscal years 2022 and 2021 are comprised of the following:

	December 31, 2022	December 31, 2021
Cash paid for operating leases	$ 849	$ 239
Assets acquired under operating leases	$ 729	$ 1,816

During the fiscal year ended December 31, 2022, the Company extended the lease terms for one of its manufacturing facilities. As a result of these lease modifications, the Company re-measured the lease liability and adjusted the ROU asset on the modification dates.

NOTE 6. – GOODWILL AND OTHER INTANGIBLE ASSETS, NET

Goodwill

The change in the carrying amount of goodwill during fiscal year 2022 was as follows:

Balance at January 1, 2022	$ —
GVB acquisition (see Note 2)	44,200
Measurement period adjustments	(11,040)
Balance at December 31, 2022	$ 33,160

Intangible Assets

Our intangible assets at December 31, 2022 and 2021 consisted of the following:

December 31, 2022	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Definite-lived:			
Patent	$ 6,513	$ (3,711)	$ 2,802
License Fees	3,876	(1,446)	2,430
Customer relationships	5,800	(20)	5,780
Total amortizing intangible assets	$ 16,189	$ (5,177)	$ 11,012
Indefinite-lived:			
Tradename and trademarks			$ 3,289
MSA signatory costs			2,202
License fee for predicate cigarette brand			350
Total indefinite-lived intangible assets			$ 5,841
Total intangible assets, net			$ 16,853

December 31, 2021	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Definite-lived:			
Patent	$ 5,902	$ (3,303)	$ 2,599
License Fees	3,876	(1,197)	2,679
Total amortizing intangible assets	$ 9,778	$ (4,500)	$ 5,278
Indefinite-lived:			
Tradename and trademarks			$ 89
MSA signatory costs			2,202
License fee for predicate cigarette brand			350
Total indefinite-lived intangible assets			$ 2,641
Total intangible assets, net			$ 7,919

See Note 2 “Business Acquisitions” for additional details regarding goodwill and intangible assets acquired during 2022 as a result of the acquisition of GVB, including measurement period adjustments.

Aggregate intangible asset amortization expense comprises of the following:

	Year Ended December 31,	
	2022	2021
Cost of goods sold	$ 10	$ 10
Sales, general, and administrative	20	—
Research and development	650	605
Total amortization expense	$ 680	$ 615

During the year ended December 31, 2022, the Company incurred impairment charges of $1,488, primarily related to write-down of tradename, as a result of a shift in strategy and changes in expected future cash flows for certain contracts supporting the associated tradename (see Note 19). During the year ended December 31, 2021, the Company incurred a charge of $78 related to a write-down of our trademarks, as a result of abandonment of the trademark as it no longer aligned to Company strategic objectives.

The impairment charges are included in Other operating expenses, net on the Company’s Consolidated Statements of Operations and Comprehensive Loss.

Estimated future intangible asset amortization expense based on the carrying value as of December 31, 2022 is as follows:

	2023	2024	2025	2026	2027	Thereafter
Amortization expense	$ 1,667	$ 1,657	$ 1,516	$ 1,261	$ 1,111	$ 3,800

NOTE 7. – INVESTMENTS & OTHER ASSETS

The carrying value of the Company’s investments at December 31, 2022 and 2021 consisted of the following:

	December 31, 2022	December 31, 2021
Panacea Life Sciences Holdings, Inc. common stock	$ —	$ 2,340
Aurora stock warrants	—	5
Change Agronomy Ltd. ordinary shares	682	—
Total investments	$ 682	$ 2,345

Investment in Panacea Life Sciences, Inc.

Initial Investment:

On December 3, 2019, the Company entered into a securities purchase agreement with Panacea Life Sciences, Inc. ("Panacea") for consideration valued at $13,297 ($12,000 cash and $1,297 of the Company's shares of common stock valued at $1 per share) in exchange for a 15.8% ownership interest. The Company's investment consisted of three instruments: shares of Series B preferred stock ("preferred stock"); a convertible note receivable with a $7,000 face value; and a warrant ("stock warrant") to purchase additional shares of Series B preferred stock, to obtain 51% ownership of Panacea, at an exercise price of $2.344 per share. The convertible note receivable had a term of five years, interest of 10% per annum, and could be converted to shares of Series B preferred stock at the Company's discretion. The embedded conversion option was not considered a derivative instrument for accounting purposes. The preferred stock carried an annual 10% cumulative dividend, compounded annually, and had an implicit put option after the fifth anniversary date so long that the stock warrants had not been exercised. The put option was not considered a derivative instrument for accounting purposes. The stock warrant was exercisable at any time after the fifth anniversary date and would be accelerated if Panacea achieved certain sales targets for two consecutive years. The Series B preferred stock also included first priority equity preferences in the event of a liquidation, sale, or transfer of Panacea assets. These rights entitled the Company to the original Series B issuance price of $7,000 plus any unpaid accrued dividends.

To allocate the cost of the stock warrant, the Company calculated a fair value based on the following assumptions: volatility of 70%, discount of 25% for lack of marketability, and a risk-free rate of 2%. The value of the stock warrant was allocated to the preferred stock and the convertible note receivable, equally, at a discount to the acquisition price. The discount on the preferred stock was determined to be for lack of control and the discount on the convertible note receivable was determined to be for issuing the note at a below market interest rate for similar instruments.

The convertible note receivable and the preferred stock investment were considered available for sale debt securities with a private company that was not traded in active markets. Since observable price quotations were not available at acquisition, fair value was estimated based on cost less an appropriate discount upon acquisition. The discount of each instrument is accreted into interest income over the respective term as shown within the Company's Consolidated Statements of Operations and Comprehensive Loss. The stock warrant was recorded at its cost basis in accordance with the practicability exception under ASU 2016-01.

Impairment of Panacea Investment:

As a result of increased competition and other macroeconomic factors, the Company recognized an impairment of $1,062 on the Panacea stock warrant during the second quarter of 2020. During the fourth quarter of 2020, the Company entered into a non-binding agreement with Panacea to potentially restructure the investment and business relationship—including the transfer of an agricultural facility and other assets. As of December 31, 2020, the Company adjusted certain assets to represent the fair value outlined in the non-binding agreement.

The Company's non-binding agreement with Panacea to restructure the investment and business relationship generally provided for (i) the transfer of $7,170 in operational assets, including an agricultural facility and various extraction and distillation equipment, from Panacea to the Company in exchange for the cancellation of the $7,000 convertible note receivable plus accrued interest; (ii) an amendment of transaction documents to remove any future investment rights and obligations of the Company in Panacea, (iii) cancellation of the stock warrant to purchase additional Series B preferred stock; and (iv) various other amendments to Panacea's charter to amend various investors rights therein.

As a result of the expected outcome of this non-binding agreement, the Company determined that the carrying value of the stock warrant and the convertible note receivable plus accrued interest exceeded the fair value outlined in the non-binding agreement. As such, the Company recorded an impairment of $679, which reduced the stock warrant carrying value, so that the carrying value of the stock warrant, and convertible note receivable plus accrued interest amounted to a value of $7,170 as of December 31, 2020.

In accordance with ASC 326- *Financial Instruments-Credit Losses*, the Company reviewed the fair value of its preferred stock investment and considered the following: (i) increased competition in the cannabinoid industry; (ii) the Company's preferred stock priority equity preferences; and (iii) other macroeconomic factors. Based on the assessment performed, it was determined that no credit loss existed for the preferred stock available-for-sale debt security.

Conversion of Panacea Investment:

On June 30, 2021, the Company entered into a Promissory Note Exchange Agreement with Panacea and a Securities Exchange Agreement with Panacea, Exactus, Inc. ("Exactus") (OTCQB:EXDI) and certain other Panacea shareholders. Pursuant to the Securities Exchange Agreement, Exactus fully acquired Panacea. These transactions effected the (i) conversion of all of the Company's Series B Preferred Stock in Panacea into 91,016,026 shares of common stock in Exactus valued at $9,102 as of June 30, 2021 and (ii) the conversion of the Company's existing debt in Panacea by converting the outstanding $7,000 principal balance convertible note receivable and all accrued but unpaid interest thereon for fee simple ownership of Needle Rock Farms (224 acres in Delta County, Colorado) and equipment valued at $2,248, $500 in Panacea's Series B Preferred Stock (which was subsequently converted to Exactus common stock under the Securities Exchange Agreement; this balance is reflected in final shares as stated above), and a new $4,300 promissory note (the "Promissory note receivable") with a maturity date of June 30, 2026 and a 0% interest rate. The Promissory note receivable is with a related party of Panacea and is fully secured by a first priority lien on Panacea's headquarters located in Golden, Colorado. All other rights and obligations of the Company in Panacea and Panacea's affiliate, Quintel-MC Incorporated, were terminated by this transaction—including all warrant rights and obligations for future investment. The conversion was recorded as a non-monetary transaction, based on the fair value of the assets received, and resulted in a gain of $2,548 which is included within the Consolidated Statements of Operations and Comprehensive Loss as "Gain on Panacea investment conversion."

The Promissory note receivable was originally valued at $3,684 ($4,300 face value less $616 discount) and is included within the Consolidated Balance Sheets as "Other Assets." The Company intends to hold the Promissory note receivable to maturity and the associated discount will be amortized into interest income over the term of the note. The ownership of Needle Rock Farms and related equipment is included within "Property, plant, and equipment, net" on the Consolidated Balance Sheets. The common shares of Exactus, Inc. are considered equity securities in accordance with ASC 321 and are recorded at fair value—changes in fair value will be included within the statement of operations. See Note 7 for additional information on the fair value measurements.

On October 25, 2021, Exactus announced the completion of a 1 for 28 reverse stock split as well as an entity name change to Panacea Life Sciences Holdings, Inc (OTCQB: PLSH). Panacea Life Sciences Holdings, Inc. was assigned a temporary stock symbol of "EXDID" which formally changed to "PLSH" after twenty business days. As a result of the reverse stock split, our 91,016,026 shares were adjusted to 3,250,573 shares.

Panacea Investment – Settlement Agreement:

On December 31, 2022, the Company and Panacea Life Sciences Holdings, Inc. entered into a settlement agreement in which the Company agreed to forfeit and return all PLSH common stock outstanding with a fair value of $229 and reduction to the face value of the Promissory note receivable of $500, in exchange for resolution to all contractual requirements from the June 30, 2021 Promissory Note Exchange Agreement and Securities Exchange Agreement surrounding the investment and business relationship. The total charge of $2,789 recorded in connection with the settlement agreement and change in fair value during the year ended December 31, 2022 is included within Realized (loss) gain on Panacea investment on the Consolidated Statements of Operations and Comprehensive Loss and is comprised of change in fair value and write-off of PLSH common stock of $2,340 and extinguishment of note receivable of $500 less adjusted discount of $51.

As of December 31, 2022, the total carrying value of the Company's investment in Panacea is outlined below:

	December 31, 2022	December 31, 2021
Panacea Holdings common stock	$ —	$ 2,340
Promissory note receivable	3,410	3,741
Total	$ 3,410	$ 6,081

Investment in Aurora Cannabis, Inc.

In 2018, in connection with the sale of its investment in a Canadian plant biotechnology company, the Company acquired stock warrants to purchase 973,971 common stock of Aurora Cannabis, Inc. ("Aurora"), a Canadian company (NYSE: ACB and TSX: ACB). The stock warrants have a five-year contractual term ending August 8, 2023 and had an exercise price of $9.37 Canadian Dollars (CAD) per share. During the second quarter of 2020, Aurora announced a 12-to-1 reverse stock split which adjusted our total warrant to purchase 81,164 shares of Aurora common stock (from 973,971) at an exercise price of $112.44 CAD per share (from $9.37 CAD per share). The warrants are considered equity securities in accordance with ASC 321 – Investments – Equity Securities and a derivative instrument under ASC 815 – Derivatives and Hedging. The stock warrants are not designated as a hedging instrument, and in accordance with ASC 815, the Company's investment in stock warrants are recorded at fair value with changes in fair value recorded to unrealized gain/loss as shown within the Company's Consolidated Statements of Operations and Comprehensive Loss. See Note 8 for additional information on the fair value measurements.

Investment in Change Agronomy Ltd.

On December 10, 2021, the Company entered into a subscription agreement to invest £500 (pounds sterling, in thousands), in exchange for 592,888 ordinary shares of Change Agronomy Ltd. ("CAL"), a private company existing under the laws of England, at a price per share of £0.84333. CAL is a vertically integrated sustainable industrial hemp business that combines genetics with leading agronomic techniques and infrastructure to provide full-service industrial hemp products to multiple global end markets. CAL presently has operations in Manitoba, Canada, and Italy. This equity investment was part of an Offer for Subscription by CAL for a minimum total of £3,000 at the same price per ordinary share. Approximately U.S. $682 in funds were wired to CAL on January 26, 2022, and our investment equated to approximately 1.8% of CAL's total equity.

In accordance with ASU 2019-04, a foreign currency-denominated equity investments that are measured using the measurement alternative are nonmonetary items that should be remeasured using their historical exchange rates. Accordingly, for the year ended December 31, 2022, there is no foreign currency exchange gain or loss recorded in the Consolidated Statement of Operations and Comprehensive Loss related to the investment in Change Agronomy Ltd.

During the years ended December 31, 2022 and 2021, respectively, there were no impairment triggering events identified for investments.

NOTE 8. – FAIR VALUE MEASUREMENTS AND SHORT-TERM INVESTMENTS

Assets and Liabilities Measured at Fair Value on a Recurring Basis

Fair value measurement standards apply to certain financial assets and liabilities that are measured at fair value on a recurring basis (each reporting period). For the Company, these financial assets and liabilities include its short-term investment securities and equity investments. The Company does not have any nonfinancial assets or liabilities that are measured at fair value on a recurring basis.

.The following table presents information about our assets and liabilities measured at fair value at December 31, 2022 and 2021, and indicates the fair value hierarchy of the valuation techniques the Company utilized to determine such fair value:

	Fair Value December 31, 2022			
	Level 1	Level 2	Level 3	Total
Assets				
Short-term investment securities:				
Money market funds	$ 10,163	$ —	$ —	$ 10,163
Corporate bonds	—	7,031	—	7,031
U.S. treasury securities	—	999	—	999
Total short-term investment securities	$ 10,163	$ 8,030	$ —	$ 18,193
Investments:				
Change Agronomy Ltd. ordinary shares	$ —	$ —	$ 682	$ 682
Total investments	$ —	$ —	$ 682	$ 682

	Fair Value December 31, 2021			
	Level 1	Level 2	Level 3	Total
Assets				
Short-term investment securities:				
Money market funds	$ 8,919	$ —	$ —	$ 8,919
Corporate bonds	—	38,481	—	38,481
Total short-term investment securities	$ 8,919	$ 38,481	$ —	$ 47,400
Investments:				
Panacea Life Sciences Holdings, Inc. common shares	$ 2,340	$ —	$ —	$ 2,340
Aurora stock warrants	—	—	5	5
Total investments	$ 2,340	$ —	$ 5	$ 2,345

Money market mutual funds are valued at their daily closing price as reported by the fund. Money market mutual funds held by the Company are open-end mutual funds that are registered with the SEC that generally transact at a stable $1.00 Net Asset Value ("NAV") representing its estimated fair value. On a daily basis the fund's NAV is determined by the fund based on the amortized cost of the funds underlying investments. The Company classifies its money market funds within Level 1 because it uses quoted market prices to determine their fair value. The Company classifies its commercial paper, corporate notes, certificates of deposit, and U.S. government bonds within Level 2 because it uses quoted prices for similar assets or liabilities in active markets and each has a specified term and all level 2 inputs are observable for substantially the full term of each instrument.

Corporate bonds are valued using pricing models maximizing the use of observable inputs for similar securities.

The investment in Panacea Holdings common shares is considered an equity security with a readily determinable fair value. The fair value is determined using the quotable market price as of the last trading day of the fiscal quarter. The change in fair value for the years ended December 31, 2022, and 2021 were losses of $2,112 and $6,761, respectively.

The following table sets forth a summary of the changes in fair value of the Company's Level 3 investments for the year ended December 31, 2022.

Fair Value at January 1, 2022	$ 5
Unrealized loss on Aurora stock warrants	(5)
Investment in Change Agronomy Ltd. ordinary shares	682
Fair Value at December 31, 2022	$ 682

The following tables set forth a summary of the Company's available-for-sale debt securities from amortized cost basis to fair value as of December 31, 2022 and 2021:

	Available for Sale Debt Securities December 31, 2022			
	Amortized Cost Basis	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Corporate bonds	$ 7,143	$ —	$ (112)	$ 7,031

	Available for Sale Debt Securities December 31, 2021			
	Amortized Cost Basis	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Corporate bonds	$ 38,643	$ 1	$ (163)	$ 38,481

The following table sets forth a summary of the Company's available-for-sale debt securities at amortized cost basis and fair value by contractual maturity as of December 31, 2022 and December 31, 2021:

	Available for Sale Debt Securities			
	December 31, 2022		December 31, 2021	
	Amortized Cost Basis	Fair Value	Amortized Cost Basis	Fair Value
Due in one year or less	$ 7,143	$ 7,031	$ 8,286	$ 8,280
Due after one year through five years	—	$ —	$ 30,357	$ 30,201
	$ 7,143	$ 7,031	$ 38,643	$ 38,481

The Company recognized interest income on short-term investment securities recorded in Interest income, net on the Consolidated Statement of Operations and Comprehensive Loss during the years ended December 31, 2022 and 2021 of $546 and $483, respectively.

Assets and Liabilities Measured at Fair Value on a Nonrecurring Basis

Fair value standards also apply to certain assets and liabilities that are measured at fair value on a nonrecurring basis. The Company's non-recurring fair value measurement as of December 31, 2022, consisted of the fair value of impaired indefinite-lived intangible asset that was determined by utilizing the relief from royalty method with Level 3 inputs, including royalty rate of 1.0% and discount rate of 24.5%.

During the years ended December 31, 2022 and 2021, the Company did not have any other financial assets or liabilities measured at fair value on a nonrecurring basis.

NOTE 9. – NOTES AND LOANS PAYABLE

The table below outlines our notes payable balances as of December 31, 2022 and 2021:

	December 31, 2022	December 31, 2021
Insurance loans payable	$ 780	$ 596
Vehicle loans	128	—
Total current notes and loans payable	$ 908	$ 596
Bridge loan	$ 2,814	$ —
Vehicle loans	187	—
Total long-term notes and loans payable	$ 3,001	$ 596

Insurance loans payable

During the second quarter of 2022, the Company renewed its Director and Officer ("D&O") insurance for a one-year policy premium totaling $2,394. The Company paid $400 as a premium down payment and financed the remaining $1,994 of policy premiums over ten months at a 3.25% annual percentage rate. Additionally, during the third quarter of 2022, the Company expanded its D&O coverage as a result of the acquisition of GVB, resulting in an additional premium down payment of $90 and financing of $168, under the same terms as the original one-year policy.

During the second quarter of 2021, the Company renewed its D&O insurance for a one-year policy premium totaling $3,315. The Company paid $662 as a premium down payment and financed the remaining $2,653 of policy premiums over nine months at a 3.49% annual percentage rate.

The Company also has other insurance loans payables related to pollution, and general liability for GVB.

Vehicle Loans

The Company has various vehicle loans with monthly payments ranging from $0.5 to $2.1, interest rates ranging from 0% to 11%, and maturity dates ranging from March 2023 to September 2026.

GVB Bridge Note

In connection with the acquisition of GVB (see Note 2), the Company assumed the outstanding principal balance of 12% secured promissory note in the principal amount of $4,250 ("GVB Bridge Note"). On October 31, 2022, the Company repaid $1,899 (outstanding principal of $1,750 and accrued interest of $149). The remaining outstanding principal of $2,500 and accrued interest was refinanced and has a maturity date of May 1, 2024 (see Note 21).

Accretion of non-cash interest expense amounted to $0 and $7 for the years ended December 31, 2022 and 2021, respectively.

Estimated future principal payments to be made under the above notes and loans payable as of December 31, 2022 are as follows:

2023	$ 908
2024	2,935
2025	59
2026	7
Total	$ 3,909

NOTE 10. – CAPITAL RAISE AND WARRANTS FOR COMMON STOCK

2022 Capital Raise

On July 21, 2022, the Company and certain institutional investors (the "Investors") entered into a securities purchase agreement (the "Securities Purchase Agreement") relating to the issuance and sale of shares of common stock pursuant to a registered direct offering (the "Registered Offering" and, together with the Private Placement (as defined below), the "Offerings"). The Investors purchased approximately $35,000 of shares, consisting of an aggregate of 17,073,175 shares of common stock at a purchase price of $2.05 per share, subject to certain restrictions. The net proceeds to the Company from the Offerings, after deducting the fees and the Company's offering expenses, were $32,484. The Offerings closed on July 25, 2022.

Pursuant to the Securities Purchase Agreement, in a concurrent private placement, the Company issued and sold to the Investors warrants (the "Warrants") to purchase up to 17,073,175 shares of common stock (the "Private Placement"). The Warrants are exercisable immediately upon issuance at an exercise price of $2.05 per share of common stock, subject to adjustment in certain circumstances, and expire on July 25, 2027.

2021 Capital Raise

On June 7, 2021, the Company and an investor entered into a securities purchase agreement relating to the issuance and sale of shares of common stock pursuant to which the investor purchased 10,000,000 shares of common stock at $4.00 per share. The net proceeds to the Company from the offering, after deducting placement agent fees and offering expenses, was $38,206.

Warrant Exercise

During the first quarter of 2021, the Company's warrant holders exercised 11,293,211 outstanding warrants for cash in exchange for common stock. In connection with these exercises, the Company received net proceeds of $11,782. The following table summarizes the Company's warrant activity since January 1, 2021:

	Number of Warrants
Warrants outstanding at January 1, 2021	11,293,211
Exercised	(11,293,211)
Issued	—
Warrants outstanding at December 31, 2021	—
Exercised	—
Issued	17,073,175
Warrants outstanding at December 31, 2022	17,073,175

NOTE 11. – RETIREMENT PLAN

The Company sponsors a defined contribution plan under IRC Section 401(k). The plan covers all employees who meet the minimum eligibility requirements. Under the 401(k) plan eligible employees are allowed to make voluntary deferred salary contribution to the plan, subject to statutory limits. The Company has elected to make Safe Harbor Non-Elective Contributions to the plan for eligible employees in the amount of three percent (3%) of the employee's compensation. Total employer contributions to the plan for the years ended December 31, 2022 and 2021 amounted to $200 and $171, respectively.

NOTE 12. – COMMITMENTS AND CONTINGENCIES

License agreements and sponsored research – The Company has entered into various license, sponsored research, collaboration, and other agreements (the "Agreements") with various counter parties in connection with the Company's plant biotechnology business relating to tobacco and hemp/cannabis. The schedule below summarizes the Company's commitments, both financial and other, associated with each Agreement. Costs incurred under the Agreements are generally recorded as research and development expenses on the Company's Consolidated Statements of Operations and Comprehensive Loss.

				Future Commitments					
Commitment	Counter Party	Product Relationship	Commitment Type	2023	2024	2025	2026	2027 & After	Total
Research Agreement	KeyGene	Hemp / Cannabis	Contract fee	$ 2,524	$ 2,058	$ 1,589	$ 1,302	$ 328	$ 7,801 (1)
License Agreement	NCSU	Tobacco	Minimum annual royalty	325	100	100	100	1,000	1,625 (2)
Research Agreement	NCSU	Tobacco	Contract fee	99	—	—	—	—	99 (3)
Sublicense Agreement	Anandia Laboratories, Inc.	Hemp / Cannabis	Annual license fee	10	10	10	100	—	130 (4)
Research Agreement	Cannametrix	Hemp / Cannabis	Contract fee	667	666	—	—	—	1,333 (5)
License Agreement	Cannametrix	Hemp / Cannabis	Minimum annual royalty	—	—	75	100	1,900	2,075 (6)
Growing Agreements	Various	Tobacco	Contract fee	242	—	—	—	—	242 (7)
Consulting Agreements	Various	Various	Contract fee	1,195	746	—	—	—	1,941 (8)
				$ 5,062	$ 3,580	$ 1,774	$ 1,602	$ 3,228	$ 15,246

(1) Exclusive agreement with the Company in the field of the Cannabis Sativa L. plant. The initial term of the agreement was five years with an option for an additional two years. On April 30, 2021, the Company and KeyGene entered into a First Amended and Restated Framework Collaborative Research Agreement which extended the agreement term, from first-quarter 2024 to first-quarter 2027, and preserves the Company's option for an additional 2-year extension, now through first quarter of 2029. On March 30, 2022, the Company and KeyGene entered into a new Framework Collaborative Research Agreement for a term of three years at an aggregate cost of $1,830 in the field related to the hops plant.

The Company will exclusively own all results and all intellectual property relating to the results of the collaboration with KeyGene (the "Results"). The Company will pay royalties in varying amounts to KeyGene relating to the Company's commercialization in the stated fields of each agreement. The Company has also granted KeyGene a license to commercialize the Results outside of each field and KeyGene will pay royalties in varying amounts to the Company relating to KeyGene's commercialization of the Results outside of each field.

(2) The minimum annual royalty fee is credited against running royalties on sales of licensed products. The Company is also responsible for reimbursing NCSU for actual third-party patent costs incurred, including capitalized patent costs and patent maintenance costs. These costs vary from year to year and the Company has certain rights to direct the activities that result in these costs.

(3) On August 19, 2022, the Company entered into a one-year Sponsored Project Agreement with NCSU for continued research of tobacco alkaloid formation.

(4) The Company is also responsible for the payment of certain costs, including, capitalized patent costs and patent maintenance costs, a running royalty on future net sales of products made from the sublicensed intellectual property, and a sharing of future sublicensing consideration received from sublicensing to third parties in all countries except for Canada. Anandia retains all patent rights, and is responsible for all patent maintenance, in Canada.

(5) On March 11, 2022, the Company expanded its research agreement with Cannametrix for hemp/cannabis product development, formulation, and validation for a three-year period at an aggregate cost of $2,000.

(6) The minimum annual royalty fee is credited against running royalties from the sales of goods or services based on Project IP and/or Background IP.

(7) Various R&D growing agreements for hemp / cannabis and tobacco.

(8) General corporate consulting agreements.

Insurance recoveries – In connection with the Grass Valley fire, the Company has recorded $5,000 asset as Insurance recoveries on the Consolidated Balance Sheets and as income offsetting property, plant and equipment and inventory casualty losses in Other operating expenses, net in the Statement of Operations and Comprehensive Loss (see Note 19). The insurance recoveries related to property, plant and equipment of $3,500 is a non-cash investing activity. Additional business interruption insurance coverage with limits of $15,000 remains pending as of December 31, 2022, and will be recognized as income when all contingencies have been resolved.

Litigation - The Company is subject to litigation arising from time to time in the ordinary course of its business. The Company does not expect that the ultimate resolution of any pending legal actions will have a material effect on its consolidated results of operations, financial position, or cash flows. However, litigation is subject to inherent uncertainties. As such, there can be no assurance that any pending legal action, which the Company currently believes to be immaterial, will not become material in the future. In accordance with applicable accounting guidance, the Company establishes an accrued liability for litigation and regulatory matters when those matters present loss contingencies that are both probable and estimable. In such cases, there may be an exposure to loss in excess of any amounts accrued. When a loss contingency is not both probable and estimable, the Company does not establish an accrued liability. As a litigation or regulatory matter develops, the Company, in conjunction with any outside counsel handling the matter, evaluates on an ongoing basis whether such matter presents a loss contingency that is probable and estimable. If, at the time of evaluation, the loss contingency related to a litigation or regulatory matter is not both probable and estimable, the matter will continue to be monitored for further developments that would make such loss contingency both probable and estimable. When a loss contingency related to a litigation or regulatory matter is deemed to be both probable and estimable, the Company will establish an accrued liability with respect to such loss contingency and record a corresponding amount of related expenses. The Company will then continue to monitor the matter for further developments that could affect the amount of any such accrued liability.

Class Action

On January 21, 2019, Matthew Jackson Bull, a resident of Denver, Colorado, filed a Complaint against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, and the Company's then Chief Financial Officer, John T. Brodfuehrer, in the United States District Court for the Eastern District of New York entitled: Matthew Bull, Individually and on behalf of all others similarly situated, v. 22nd Century Group, Inc., Henry Sicignano III, and John T. Brodfuehrer, Case No. 1:19 cv 00409.

On January 29, 2019, Ian M. Fitch, a resident of Essex County Massachusetts, filed a Complaint against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, and the Company's then Chief Financial Officer, John T. Brodfuehrer, in the United States District Court for the Eastern District of New York entitled: Ian Fitch, Individually and on behalf of all others similarly situated, v. 22nd Century Group, Inc., Henry Sicignano III, and John T. Brodfuehrer, Case No. 2:19 cv 00553.

On May 28, 2019, the plaintiff in the Fitch case voluntarily dismissed that action. On August 1, 2019, the Court in the Bull case issued an order designating Joseph Noto, Garden State Tire Corp, and Stephens Johnson as lead plaintiffs.

On September 16, 2019, pursuant to a joint motion by the parties, the Court in the Bull case transferred the class action to federal district court in the Western District of New York, where it remains pending as Case No. 1:19-cv-01285.

Plaintiffs in the Bull case filed an Amended Complaint on November 19, 2019 that alleges three counts: Count I sues the Company and Messrs. Sicignano and Brodfuehrer and alleges that the Company's quarterly and annual reports, SEC filings, press releases and other public statements and documents contained false statements in violation of Section 10(b) of the Securities Exchange Act and Rule 10b-5; Count II sues Messrs. Sicignano and Brodfuehrer pursuant to Section 10(b) of the Securities Exchange Act and Rule 10b5(a) and (c); and Count III sues Messrs. Sicignano and Brodfuehrer for the allegedly false statements pursuant to Section 20(a) of the Securities Exchange Act. The Amended Complaint seeks to certify a class, and unspecified compensatory and punitive damages, and attorney's fees and costs.

On January 29, 2020, the Company and Messrs. Sicignano and Brodfuehrer filed a Motion to Dismiss the Amended Complaint. On January 14, 2021, the Court granted the motion, dismissing all claims with prejudice. The Plaintiffs filed a notice of appeal on February 12, 2021 to the Second Circuit Court of Appeals. On May 24, 2022, after briefing and oral argument, the Second Circuit issued an order affirming in part, and reversing in part, the District Court's dismissal order. The Second Circuit affirmed the District Court's dismissal of the claims relating to the non-disclosure of stock promotion articles, but reversed the District Court's dismissal order of the claims alleging the non-disclosure of an SEC investigation. The Second Circuit noted in its opinion, however, that the District Court had not addressed certain arguments raised by the Company and Messrs. Sicignano and Brodfuehrer in the Motion to Dismiss the Amended Complaint as to these remaining claims, and remanded the case to the District Court to address these arguments for the dismissal of the remaining claims. On August 8, 2022, the Company and Messrs. Sicignano and Brodfuehrer filed a renewed motion to dismiss the remaining claims in the Amended Complaint to address the arguments not previously addressed by the District Court. On September 22, 2022, Plaintiffs filed a brief in opposition to the motion. On October 12, 2022, the Company and Messrs. Sicignano and Brodfuehrer filed a reply brief in further support of the motion. On January 6, 2023, the District Court denied the motion to dismiss, and the case will proceed forward on the remaining claims. No trial date has been set. The parties have scheduled a mediation during March 2023.

We believe that the claims are frivolous, meritless and that the Company and Messrs. Sicignano and Brodfuehrer have substantial legal and factual defenses to the remaining claims. We intend to vigorously defend the Company and Messrs. Sicignano and Brodfuehrer against such claims.

Shareholder Derivative Cases

On February 6, 2019, Melvyn Klein, a resident of Nassau County New York, filed a shareholder derivative claim against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, the Company's Chief Financial Officer, John T. Brodfuehrer, and each member of the Company's Board of Directors in the United States District Court for the Eastern District of New York entitled: Melvyn Klein, derivatively on behalf of 22nd Century Group v. Henry Sicignano, III, Richard M. Sanders, Joseph Alexander Dunn, Nora B. Sullivan, James W. Cornell, John T. Brodfuehrer and 22nd Century Group, Inc., Case No. 1:19 cv 00748. Mr. Klein brings this action derivatively alleging that (i) the director defendants supposedly breached their fiduciary duties for allegedly allowing the Company to make false statements; (ii) the director defendants supposedly wasted corporate assets to defend this lawsuit and the other related lawsuits; (iii) the defendants allegedly violated Section 10(b) of the Securities Exchange Act and Rule 10b 5 promulgated thereunder for allegedly approving or allowing false statements regarding the Company to be made; and (iv) the director defendants allegedly violated Section 14(a) of the Securities Exchange Act and Rule 14a 9 promulgated thereunder for allegedly approving or allowing false statements regarding the Company to be made in the Company's proxy statement.

On February 11, 2019, Stephen Mathew filed a shareholder derivative claim against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, the Company's Chief Financial Officer, John T. Brodfuehrer, and each member of the Company's Board of Directors in the Supreme Court of the State of New York, County of Erie, entitled: Stephen Mathew, derivatively on behalf of 22nd Century Group, Inc. v. Henry Sicignano, III, John T. Brodfuehrer, Richard M. Sanders, Joseph Alexander Dunn, James W. Cornell, Nora B. Sullivan and 22nd Century Group, Inc., Index No. 801786/2019. Mr. Mathew brings this action derivatively generally alleging the same allegations as in the Klein case. The Complaint seeks declaratory relief, unspecified monetary damages, corrective corporate governance actions, and attorney's fees and costs.

On August 15, 2019, the Court consolidated the Mathew and Klein actions pursuant to a stipulation by the parties (Western District of New York, Case No. 1-19-cv-0513). On May 3, 2019, the Court ordered the *Mathew* case stayed. This stay was applied to the Consolidated Action pursuant to the Court's August 15, 2019 Order Consolidated Related Shareholder Derivative Actions and Establishing a Leadership Structure. As a result of the Court's denial of the renewed Motion to Dismiss the Amended Complaint, the May 3, 2019 stay will be lifted. No trial date has been set. We believe that the claims are frivolous, meritless and that the Company and the individual defendants have substantial legal and factual defenses to the claims. We intend to vigorously defend the Company and the individual defendants against such claims.

On June 10, 2019, Judy Rowley filed a shareholder derivative claim against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, the Company's Chief Financial Officer, John T. Brodfuehrer, and each

member of the Company's Board of Directors in the Supreme Court of the State of New York, County of Erie, entitled: Judy Rowley, derivatively on behalf of 22nd Century Group, Inc. v. Henry Sicignano, III, Richard M. Sanders, Joseph Alexander Dunn, Nora B. Sullivan, James W. Cornell, John T. Brodfuehrer, and 22nd Century Group, Inc., Index No. 807214/2019. Ms. Rowley brought the action derivatively alleging that the director defendants supposedly breached their fiduciary duties by allegedly allowing the Company to make false statements. The Complaint sought declaratory relief, unspecified monetary damages, corrective corporate governance actions, and attorney's fees and costs. We believe that the claims are frivolous, meritless and that the Company and the individual defendants have substantial legal and factual defenses to the claims. We intend to vigorously defend the Company and the individual defendants against such claims. On September 13, 2019, the Court ordered the litigation stayed pursuant to a joint stipulation by the parties. On August 3, 2022, Plaintiff dismissed the case with prejudice by filing a stipulation of discontinuance with the Court. This dismissal was not pursuant to a settlement.

On January 15, 2020, Kevin Broccuto filed a shareholder derivative claim against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, the Company's Chief Financial Officer, John T. Brodfuehrer, and certain members of the Company's prior Board of Directors in the District Court of the State of Nevada, County of Clark, entitled: Kevin Broccuto, derivatively on behalf of 22nd Century Group, Inc. v. James W. Cornell, Richard M. Sanders, Nora B. Sullivan, Henry Sicignano, III, and John T. Brodfuehrer, Case No. A-20-808599. Mr. Broccuto brings this action derivatively alleging three counts: Count I alleges that the defendants breached their fiduciary duties; Count II alleges they committed corporate waste; and Count III that they were unjustly enriched, by allegedly allowing the Company to make false statements.

On February 11, 2020, Jerry Wayne filed a shareholder derivative claim against the Company, the Company's then Chief Executive Officer, Henry Sicignano III, the Company's Chief Financial Officer, John T. Brodfuehrer, and certain members of the Company's prior Board of Directors in the District Court of the State of Nevada, County of Clark, entitled: Jerry Wayne, derivatively on behalf of 22nd Century Group, Inc. v. James W. Cornell, Richard M. Sanders, Nora B. Sullivan, Henry Sicignano, III, and John T. Brodfuehrer, Case No. A-20-808599. Mr. Wayne brings this action derivatively alleging generally the same allegations as the Broccuto case. The Complaint seeks unspecified monetary damages, corrective corporate governance actions, disgorgement of alleged profits and imposition of constructive trusts, and attorney's fees and costs. The Complaint also seeks to declare as unenforceable the Company's Bylaw requiring derivative lawsuits to be filed in Erie County, New York, where the Company is headquartered.

On March 25, 2020, the Court ordered the Broccuto and Wayne cases consolidated and stayed pursuant to a joint stipulation from the parties. On June 27, 2022, the Court ordered that the stay continue until thirty (30) days after the District Court rules on the renewed Motion to Dismiss the Amended Complaint in the Noto Class Action case. As a result of the Court's denial of the Motion to Dismiss the Amended Complaint, the June 27, 2022 stay will be lifted. No trial date has been set. The parties have scheduled a mediation during March 2023. We believe that the claims are frivolous, meritless and that the Company and the individual defendants have substantial legal and factual defenses to the claims. We intend to vigorously defend the Company and the individual defendants against such claims.

NOTE 13. – LOSS PER COMMON SHARE

The following table sets forth the computation of basic and diluted loss per common share for the years ended December 31, 2022 and 2021, respectively. Outstanding warrants, options, and restricted stock units were excluded from the calculation of diluted EPS as the effect was antidilutive.

	Year Ended December 31,	
	2022	2021
	(in thousands, except for per-share data)	
Net loss	$ (59,801)	$ (32,609)
Weighted average common shares outstanding - basic and diluted	192,837	156,208
Net loss per common share - basic and diluted	$ (0.31)	$ (0.21)
Anti-dilutive shares are as follows as of December 31:		
Warrants	17,073	—
Options	4,912	5,171
Restricted stock units	4,033	3,165
	26,018	8,336

NOTE 14. – ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)

The following table is a summary of the components and activity of Accumulated Other Comprehensive Income (Loss) ("AOCI") as of and for the year-ended December 31, 2022 and 2021, respectively:

	Years Ended December 31, 2022 and 2021				
	Corporate securities/ investments	Foreign Translation Adjustment	Pre-tax Amount	Tax	Net of Tax Amount
Balance at January 1, 2021	**$ 74**	**$ —**	**$ 74**	**$ —**	**$ 74**
Unrealized loss on short-term investment securities	(236)	—	(236)	—	(236)
Balance at December 31, 2021	**$ (162)**	**$ —**	**$ (162)**	**$ —**	**$ (162)**
Unrealized loss on short-term investment securities	(316)	—	(316)	—	**(316)**
Foreign currency translation	—	1	1	—	1
Reclassification of realized losses to net loss	366	—	366	—	366
Balance at December 31, 2022	**$ (112)**	**$ 1**	**$ (111)**	**$ —**	**$ (111)**

NOTE 15. – EQUITY BASED COMPENSATION

Stock Compensation Plan

On May 20, 2021, the stockholders of 22nd Century Group, Inc. (the "Company") approved the 22nd Century Group, Inc. 2021 Omnibus Incentive Plan (the "2021 Plan"). The 2021 Plan allows for the granting of equity awards to eligible individuals over the life of the 2021 Plan, including the issuance of up to 5,000,000 shares of the Company's common stock, in addition to any remaining shares under the Company's 2014 Omnibus Incentive Plan pursuant to awards under the 2021 Plan. The 2021 Plan has a term of ten years and is administered by the Compensation Committee of the Company's Board of Directors to determine the various types of incentive awards that may be granted to recipients under the 2021 Plan and the number of shares of common stock to underlie each such award under the 2021 Plan. As of December 31, 2022, the Company had available 4,461,984 shares remaining for future awards under the 2021 Plan.

Compensation Expense

The Company recognized the following compensation costs, net of actual forfeitures, related to RSUs and stock options:

	Year Ended December 31,	
	2022	2021
Sales, general, and administrative	$ 5,307	$ 3,821
Research and development	182	163
Total RSUs and stock option compensation	$ 5,489	$ 3,983

Restricted Stock Units ("RSUs"). We typically grant RSUs to employees and non-employee directors. The following table summarizes the changes in unvested RSUs from January 1, 2021 through December 31, 2022.

	Unvested RSUs	
	Number of Shares	Weighted Average Grant-date Fair Value
	in thousands	$ per share
Unvested at January 1, 2021	2,938	$ 0.85
Granted	2,200	$ 3.25
Vested	(1,660)	$ 0.85
Forfeited	(313)	$ 1.04
Unvested at December 31, 2021	3,165	$ 2.50
Granted	3,535	$ 1.96
Vested	(2,306)	$ 2.11
Forfeited	(361)	$ 2.39
Unvested at December 31, 2022	4,033	$ 2.13

The fair value of RSUs that vested during the years ended December 31, 2022 and 2021 was approximately $4,505 and $5,262, respectively, based on the stock price at the time of vesting. As of December 31, 2022, unrecognized compensation expense for RSUs amounted to $4,189 which is expected to be recognized over a weighted average period of approximately 0.8 years. In addition, there is approximately $1,310 of unrecognized compensation expense that requires the achievement of certain milestones which are not yet probable.

Stock Options. Our outstanding stock options were valued using the Black-Scholes option-pricing model on the date of the award. A summary of all stock option activity since January 1, 2021 is as follows:

	Number of Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
	in thousands	$ per share		
Outstanding at January 1, 2021	6,581	$ 1.50		
Granted	235	3.10		
Exercised	(984)	1.37		
Forfeited	(600)	1.00		
Expired	(61)	2.64		
Outstanding at December 31, 2021	5,171	1.65		
Exercised	(150)	1.16		
Forfeited	(100)	1.39		
Expired	(9)	2.76		
Outstanding at December 31, 2022	4,912	$ 1.67	2.3 years	$ —
Exercisable at December 31, 2022	4,812	$ 1.65	2.2 years	$ —

The intrinsic value of a stock option is the amount by which the current market value or the market value upon exercise of the underlying stock exceeds the exercise price of the option.

The fair value of each option grant is estimated on the date of grant using the Black-Scholes option-pricing model. No option awards were granted in 2022. The following assumptions were used for the year ended December 31, 2021:

	2021
Risk-free interest rate (1)	0.54 %
Expected dividend yield (2)	— %
Expected volatility (3)	87.92 %
Expected term of stock options (4)	4.09 years

(1) The risk-free interest rate is based on the period matching the expected term of the stock options based on the U.S. Treasury yield curve in effect on the grant date.
(2) The expected dividend yield is assumed as zero. The Company has never paid cash dividends nor does it anticipate paying dividends in the foreseeable future.
(3) The expected volatility is based on historical volatility of the Company's stock.
(4) The expected term represents the period of time that options granted are expected to be outstanding based on vesting date and contractual term.

As of December 31, 2022, there is approximately $190 of unrecognized compensation expense for stock options that requires the achievement of certain milestones which are not yet probable.

NOTE 16. – INCOME TAXES

The following is a summary of the components giving rise to the income tax (benefit) provision for the years ended December 31, 2022 and 2021:

	2022	2021
Current:		
Federal	$ —	$ —
State	14	—
Foreign	—	—
Total current provision	$ 14	$ —
Deferred:		
Federal	(11,319)	(7,566)
State	(4,978)	(1)
Foreign	(24)	—
Total deferred benefit	(16,321)	(7,567)
Change in valuation allowance	15,873	7,581
Total income tax (benefit) / provision	$ (434)	$ 14

The (benefit) provision for income tax varies from that which would be expected based on applying the statutory federal rate to pre-tax book loss, including the effect of the change in the U.S. corporate income tax rates, as follows:

	2022	2021
Statutory federal rate	21.0 %	21.0 %
Other items	(0.6)	(0.5)
Stock based compensation	(0.8)	2.7
Research and development credit carryforward	—	0.1
State tax, net of federal benefit	8.3	—
162(m) limitation	(0.6)	—
Valuation allowance	(26.6)	(23.3)
Effective tax rate	0.7 %	— %

Individual components of deferred taxes consist of the following as of December 31:

	2022	2021
Deferred tax assets:		
Net operating loss carry-forward	$ 39,806	$ 24,859
Inventory	694	104
Stock-based compensation	1,167	1,326
Investment in Panacea Life Sciences, Inc.	79	1,320
Investment in Aurora Cannabis, Inc.	53	46
Start-up expenditures	175	177
Research and development credit carryforward	1,205	1,192
Accrued bonus	537	411
Severance liability	151	50
Allowance for doubtful accounts	89	—
Research and development costs	1,521	—
Operating lease obligations	672	365
Capital loss on investment	2,209	107
Capitalized legal fees	178	—
Other	106	18
	$ 48,642	$ 29,975
Deferred tax liabilities:		
Machinery and equipment	(757)	(254)
Patents and trademarks	(356)	(373)
Operating lease right-of-use assets	(638)	(362)
Other intangible assets	(2,470)	(259)
	(4,221)	(1,248)
Valuation allowance	(44,652)	(28,779)
Net deferred taxes	$ (231)	$ (52)

The Company has net operating loss ("NOL") carryforwards of approximately $120,023 as of December 31, 2022 that do not expire. The Company had accumulated an NOL carryforward of approximately $46,920 through December 31, 2017 and this NOL carryforward begins to expire in 2030. As of December 31, 2022, the Company has a research and development credit carryforward of approximately $1,205 that begins to expire in 2030. The Company generated a capital loss carryover of approximately $9,271 as of December 31, 2022, that begins to expire in 2026. Utilization of these NOL carryforwards may be subject to an annual limitation in the case of equity ownership changes, as defined by law. Due to the uncertainty of the Company's ability to generate sufficient taxable income in the future, the Company has recorded a valuation allowance to reduce the net deferred tax asset to zero. These carryforwards are included in the net deferred tax asset that has been fully offset by the valuation allowance. The valuation allowance increased by $15,873 and $7,581 for the years ended December 31, 2022, and 2021, respectively.

ASC 740 provides guidance on the financial statement recognition and measurement for uncertain income tax positions that are taken or expected to be taken in a company's income tax return. The Company has evaluated its tax positions and believes there are no uncertain tax positions as of December 31, 2022.

NOTE 17. – SEGMENT AND GEOGRAPHIC INFORMATION

The Company organizes its business into two reportable segments: (1) Tobacco and (2) Hemp/Cannabis. This segment structure reflects the financial information and reports used by the Company's management, specifically its Chief Operating Decision Maker, to make decisions regarding the Company's business, including resource allocations and performance assessments. This segment structure reflects the Company's current operating focus in compliance with ASC 280, *Segment Reporting*.

The Company defines segment income from operations as revenues, net less cost of goods sold and expenses attributable to segment-specific selling, general, administrative, research, development, and other operating activities. The remaining unallocated operating and other income and expenses are primarily administrative corporate overhead expenses such as corporate personnel costs, equity compensation, investor relations, strategic consulting, research and development costs that apply broadly to the overall plant science platform, and that are not allocated to reportable segments. Unallocated corporate assets consist of cash and cash equivalents, short-term investment securities, prepaid and other assets, property and equipment, and intangible assets. Transactions between the two segments are not significant.

The following table presents revenues, net by segment for fiscal years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Tobacco	$ 40,501	$ 30,905
Hemp/cannabis	21,610	43
Total revenues, net	$ 62,111	$ 30,948

The following table presents income from continuing operations for the Company's reportable segments for fiscal years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Tobacco	$ 5,753	$ 2,527
Hemp/cannabis	15,870	624
Total segment operating loss	21,623	3,151
Unallocated operating expenses	35,483	25,261
Operating loss	57,106	28,412
Hemp/cannabis other (income) expense, net	227	-
Unallocated other (income) expense, net	2,902	4,183
Loss before income taxes	$ 60,235	$ 32,595

(1) In the fourth quarter of 2022, the Company recorded pre-tax charges and other expenses of $4,799 related to the Grass Valley fire. These charges were included in Other operating expenses, net as described in Note 19.

The following table presents depreciation and amortization expense for the Company's reportable segments for fiscal years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Tobacco	$ 606	$ 546
Hemp/cannabis	1,475	37
Total depreciation and amortization included in segment operating loss	2,081	583
Unallocated depreciation and amortization	777	665
Total depreciation and amortization	$ 2,858	$ 1,248

The following table presents total assets for the Company's reportable segments as of December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Tobacco	$ 15,748	$ 10,746
Hemp/cannabis	65,965	2,266
Total reportable segments	81,713	13,013
Unallocated assets	32,938	62,942
Total assets	$ 114,651	$ 75,954

The following table presents capital expenditures for the Company's reportable segments for fiscal years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Tobacco	$ 650	$ 461
Hemp/cannabis	2,549	-
Total reportable segments	3,198	461
Unallocated expenditures for long-lived tangible assets	459	286
Total expenditures	$ 3,657	$ 745

Geographic Area Information

For the years ended December 31, 2022 and 2021, substantially all third-party sales of product are shipped to customers in the United States. Additionally, as of December 31, 2022, and 2021, substantially all long-lived assets are physically located or domiciled in the United States.

NOTE 18. – REVENUE RECOGNITION

Tobacco

The Company's tobacco reportable segment revenues are derived primarily from contract manufacturing organization ("CMO") customer contracts that consist of obligations to manufacture the customers' branded filtered cigars and cigarettes. Additional revenues are generated from sale of the Company's proprietary low nicotine content cigarettes, sold under the brand name VLN®, or research cigarettes sold under the brand name SPECTRUM®.

The Company recognizes revenue when it satisfies a performance obligation by transferring control of the product to a customer. For certain CMO contracts, the performance obligation is satisfied over time as the Company determines, due to contract restrictions, it does not have an alternative use of the product and it has an enforceable right to payment as the product is manufactured. The Company recognizes revenue under those contracts at the unit price stated in the contract based on the units manufactured. Tobacco revenue from the sale of the Company's products, which include excise taxes and shipping and handling charges billed to customers, is recognized net of cash discounts, sales returns and allowances. There was no allowance for discounts or returns and allowances at December 31, 2022 and December 31, 2021. Excise taxes recorded in Cost of Goods Sold on the Consolidated Statement of Operations and Comprehensive Loss for the years ended December 31, 2022 and 2021 was $12,619 and $10,135, respectively.

Hemp/Cannabis

The Company's hemp/cannabis reportable segment revenues are derived primarily from a CBD wholesale extracts and bulk ingredient distillate or isolate. Additional revenues are generated from private/white label contract manufacturing.

The Company recognizes revenue when it satisfies a performance obligation by transferring control of the product to a customer. Revenue is recorded at the estimated amount of consideration to which the Company expects to be entitled. For certain sales where the company licenses its formulations for hemp-based products, it recognizes revenue once the products have been sold to customers by the licensee.

When applicable, the Company pays imports duties in the various countries to which it sends products to and bills the customer for such import costs. The Company recognizes the import duties as part of revenue in accordance with ASC 606.

There are no material sales provisions or volume discounts that provide variability in recording revenue amounts.

Disaggregation of Revenue

The Company's net revenue is derived from customers located primarily in the United States and is disaggregated by major product line because the Company believes it best depicts the nature, amount, and timing of revenue and cash flows. Revenue recognized from Tobacco products transferred to customers over time represented 74% and 68%, for the year ended December 31, 2022 and 2021, respectively. Revenue recognized from Hemp/cannabis products transferred to customers over time represented 4% and 0%, for the year ended December 31, 2022 and 2021, respectively.

	Year Ended December 31,	
	2022	2021
Tobacco	$ 40,501	$ 30,905
Hemp/cannabis	21,610	43
Total revenues, net	$ 62,111	$ 30,948

The following table presents net revenues by significant customers, which are defined as any customer who individually represents 10% or more of disaggregated product line net revenues:

	Year Ended December 31,			
	2022		2021	
	Tobacco	Hemp/cannabis	Tobacco	Hemp/cannabis
Customer A	21.69 %	*	26.00 %	*
Customer B	19.55 %	*	27.04 %	*
Customer C	23.31 %	*	*	*
Customer D	*	*	*	10.81 %
Customer E	*	*	*	81.01 %
Customer F	*	12.03 %	*	*
Customer G	*	11.29 %	*	*
All other customers	35.45 %	76.68 %	46.96 %	8.18 %

*Less than 10% of product line's total revenues for the period.

Contract Assets and Liabilities

Unbilled receivables (contract assets) represent revenues recognized for performance obligations that have been satisfied but have not been billed. These receivables are included as Accounts receivable, net on the Consolidated Balance Sheets. Customer payment terms vary depending on the terms of each customer contract, but payment is generally due prior to product shipment or within extended credit terms up to twenty-one (21) days after shipment. Deferred Revenue (contract liabilities) relate to down payments received from customers in advance of satisfying a performance obligation. This deferred revenue is included as Deferred income on the Consolidated Balance Sheets.

Total contract assets and contract liabilities are as follows:

	December 31, 2022	December 31, 2021
Unbilled receivables	$ 354	$ 178
Deferred revenue	(831)	(119)
Net contract assets (liabilities)	$ (477)	$ 59

During the years ended December 31, 2022 and 2021, the Company recognized $59 and $77 of revenue that was included in the contract asset balance as of December 31, 2021 and 2020 respectively.

NOTE 19. – OTHER OPERATING EXPENSES, NET

The components of "Other operating expenses, net" were as follows:

	Year Ended December 31,	
	2022	2021
Grass Valley fire:		
Fixed asset write-offs	$ 5,550	$ -
Inventory charges	3,998	-
Compensation & benefits	195	-
Professional services	36	-
Lease obligations	20	-
Insurance recoveries	(5,000)	-
Total Grass Valley fire	4,799	-
Acquisition costs	1,046	-
Impairment of intangible assets	1,488	78
Impairment of inventory	237	-
(Gain) loss on sale or disposal of property, plant and equipment	(368)	-
Total other operating expenses, net	$ 7,202	$ 78

Grass Valley Fire

In November 2022, there was a fire at our Grass Valley manufacturing facility in Oregon, which manufactures bulk ingredients, primarily CBD isolate and distillate.

We recognized fixed asset write-offs and inventory charges of $5,550, $3,998, respectively, related to property destroyed in the fire in the fourth quarter of 2022. The associated lease ROU asset and lease liability were also written-off, with remaining lease obligation of $20 being recorded for December rent. We have incurred certain fees for various professional services in 2022 in connection with the assessment of the fire and the efforts to rebuild and resume operations. Further, we incurred $195 of compensation and benefits in 2022 for Grass Valley manufacturing employees, subsequent to the fire. In connection with the Grass Valley fire, we have recognized anticipated insurance recoveries deemed probable

of collection of $5,000 in 2022 related to our ongoing insurance claim for property damage, which the corresponding receivable is recorded as Prepaids and other current assets on the Consolidated Balance Sheet as of December 31, 2022.

Additional business interruption insurance coverage with limits of $15,000 remains pending as of December 31, 2022, and will be recognized as income when all contingencies have been resolved.

Acquisition Costs

During 2022, acquisition costs include $1,046 primarily related to the acquisition of GVB Biopharma and consist primarily of professional fees and others costs.

Other general charges

During 2022 and 2021, the Company recorded other impairment charges in connection with intangible assets subject to amortization that are periodically reviewed for strategic importance and commercialization opportunity prior to expiration and we recorded an impairment charge for the tradename intangible asset impacted by changes to expect future cash flows of $1,453.

Additionally, the Company recorded an inventory write-down in the fourth quarter in connection with unavoidable casualty from a weather event that resulted in hemp/cannabis crop loss.

NOTE 20. – QUARTERLY REVENUE AND EARNINGS DATA – UNAUDITED

	Three Months Ended			
	December 31, 2022 (1)	September 30, 2022	June 30, 2022	March 31, 2022
Revenues, net	$ 19,206	$ 19,383	$ 14,477	$ 9,045
Gross profit (loss)	$ (646)	$ 619	$ 892	$ 309
Net loss	$ (26,283)	$ (13,102)	$ (11,498)	$ (8,918)
Net loss per common share - basic and diluted (2)	$ (0.12)	$ (0.06)	$ (0.06)	$ (0.05)

	Three Months Ended			
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021
Revenues, net	$ 7,960	$ 7,811	$ 8,371	$ 6,806
Gross profit	$ 231	$ 292	$ 448	$ 515
Net loss	$ (13,964)	$ (9,440)	$ (4,174)	$ (5,031)
Net loss per common share - basic and diluted	$ (0.09)	$ (0.06)	$ (0.03)	$ (0.03)

(1) In the fourth quarter of 2022, the Company recorded pre-tax charges and other expenses of $4,799 related to the Grass Valley fire. These charges were included in Other operating expenses, net as described in Note 19.

(2) The quarterly per share data in this table has been rounded to the nearest $0.01 and therefore may not sum to total year-to-date EPS.

NOTE 21. – SUBSEQUENT EVENTS

Acquisition of RX Pharmatech Ltd

On January 19, 2023, the Company acquired RX Pharmatech Ltd ("RXP") a privately held distributor of cannabinoids with 1,276 novel food applications with the U.K. Food Standards Agency ("FSA"). RXP's products include CBD isolate and numerous variations of finished products like gummies, oils, drops, candies, tinctures, sprays, capsules and others. The Company paid $200 in cash and $450 in stock and may pay up to an additional $1,550 of contingent earn out over the next three years based on specified conditions being met. The Company expects to determine the preliminary purchase price allocation prior to the end of the first quarter of 2023.

Insurance Recoveries

During the first quarter of 2023, the Company received $5,000 of casualty loss insurance recoveries from the Grass Valley fire.

New Senior Secured Credit Facility

On March 3, 2023, the Company entered into a Securities Purchase Agreement (the "Purchase Agreement") with each of the purchasers party thereto (each, including its successors and assigns, a "Purchaser" and collectively, the "Purchasers") and JGB Collateral, LLC, a Delaware limited liability company, as collateral agent for the Purchasers (the "Agent"). Pursuant to the Purchase Agreement, the Company agreed to sell to the Purchasers (i) 5% Original Issue Discount Senior Secured Debentures (the "Debentures") with an aggregate principal amount of $21,052,632 and (ii) warrants to purchase up to 5,000,000 shares of the Company's common stock, par value $0.00001 per share (the "Common Stock"), for an exercise price of $1.275 per share, a 50% premium to the VWAP on the closing date (the "JGB Warrants"), subject to adjustments as set forth in the JGB Warrants, for a total purchase price of $20,000,000.

The Debentures bear interest at a rate of 7% per annum, payable monthly in arrears as of the last trading day of each month and on the maturity date. The Debentures mature on March 3, 2026. At the Company's election, subject to certain conditions, interest can be paid in cash, shares of the Company's common stock, or a combination thereof. The Debentures are subject to an exit payment equal to 5% of the original principal amount, or $1,052,632, payable on the maturity date or the date the Debentures are paid in full (the "Exit Payment"). Any time after, March 3, 2024, the Company may irrevocably elect to redeem all of the then outstanding principal amount of the Debentures for cash in an amount equal to the entire outstanding principal balance, including accrued and unpaid interest, the Exit Payment and a prepayment premium in an amount equal to 3% of the outstanding principal balance as of the prepayment date (collectively, the "Prepayment Amount"). Upon the entry into a definitive agreement that would effect a change in control (as defined in the Debentures) of the Company, the Agent may require the Company to prepay the outstanding principal balance in an amount equal to the Prepayment Amount. Commencing on March 3, 2024, at its option, the holder of a Debenture may require the Company to redeem 2% of the original principal amount of the Debentures per calendar month which amount may at the Company's election, subject to certain exceptions, be paid in cash, shares of the Company's common stock, or a combination thereof.

The JGB Warrants are exercisable for five years from September 3, 2023, at an exercise price of $1.275 per share, a 50% premium to the VWAP on the closing date, subject, with certain exceptions, to adjustments in the event of stock splits, dividends, subsequent dilutive offerings and certain fundamental transactions, as more fully described in the JGB Warrant.

GVB Bridge Loan

On March 3, 2023, the Company executed a Subordinated Promissory Note (the "Subordinated Note") with a principal amount of $2,864,767 in favor of Omnia Ventures, LP ("Omnia"). The Subordinated Note refinanced the 12% Secured Promissory Note with a principal amount of $1,000,000 dated as of October 29, 2021 payable to Omnia (the "October Note") and the 12% Secured Promissory Note with a principal amount of $1,500,000 dated as of January 14, 2022 payable to Omnia (the "January Note", and together with the October Note, the "Original Notes"), which were

assumed by the Company in connection with the acquisition of GVB Biopharma. The maturity date of the Subordinated Note is May 1, 2024.

Under the terms of the Subordinated Note, the Company is obligated to make interest payments in-kind (the "PIK Interest"). The PIK Interest accrues at a rate of 26.5% per annum, payable monthly. The Company is not permitted to prepay all or any portion of the outstanding balance on the Subordinated Note prior to maturity.

In connection with the Subordinated Note, the Company issued to Omnia, warrants to purchase up to 675,000 shares of the Company's Common Stock (the "Omnia Warrants"). The Omnia Warrants are exercisable for seven years from September 3, 2023, at an exercise price of $0.855 per share, subject, with certain exceptions, to adjustments in the event of stock splits, dividends, subsequent dilutive offerings and certain fundamental transactions, as more fully described in the Omnia Warrants.

Item 15(b). Exhibits

In reviewing the agreements included as exhibits to this report, please remember they are included to provide you with information regarding their terms and are not intended to provide any other factual or disclosure information about the Company, its subsidiaries or other parties to the agreements. The agreements contain representations and warranties by each of the parties to the applicable agreement. These representations and warranties have been made solely for the benefit of the other parties to the applicable agreement and:

- should not in all instances be treated as categorical statements of fact, but rather as a way of allocating the risk to one of the parties if those statements prove to be inaccurate;
- have been qualified by disclosures that were made to the other party in connection with the negotiation of the applicable agreement, which disclosures are not necessarily reflected in the agreement;
- may apply standards of materiality in a way that is different from what may be viewed as material to you or other investors; and
- were made only as of the date of the applicable agreement or such other date or dates as may be specified in the agreement and are subject to more recent developments.

Accordingly, these representations and warranties may not describe the actual state of affairs as of the date they were made or at any other time. We acknowledge that, notwithstanding the inclusion of the foregoing cautionary statements, we are responsible for considering whether additional specific disclosures of material information regarding material contractual provisions are required to make the statements in this report not misleading. Additional information about the Company may be found elsewhere in this report and the Company's other public files, which are available without charge through the SEC's website at http://www.sec.gov.

Exhibit No.	Description
2.1	Reorganization and Acquisition Agreement between the Company and GVB Biopharma (incorporated by reference to Exhibit 2.1 of the Company's Current Report on Form 8-K filed with the Commission on May 18, 2022).
3.1	Amended and Restated Certificate of Incorporation of the Company (incorporated herein by reference to Exhibit 3.2 of the Company's Annual Report on Form 10-K for the year ended September 30, 2010 filed with the Commission on December 1, 2010).
3.1.1	Amendment to Certificate of Incorporation of the Company (incorporated by reference to Appendix A to the Company's Definitive Proxy Statement filed with the Commission on March 4, 2014).
3.2	Amended and Restated Bylaws of the Company (incorporated herein by reference to Exhibit 3.2 of the Company's Annual Report on Form 10-K for the year ended December 31, 2014 filed with the Commission on January 30, 2014).
3.2.1	Amendment No. 1 to Amended and Restated Bylaws of the Company (incorporated herein by reference to Exhibit 3.2 of the Company's Form 8-K filed with the Commission on April 28, 2015).
4.1	Description of Securities Registered Pursuant to Section 12 (incorporated by reference to Exhibit 4.1 to the Company's Form 10-K filed on March 1, 2022)
4.2	Form of Warrant (incorporated by reference from Exhibit 4.1 to the Company's Form 8-K filed with the Commission on July 25, 2022).
4.3*	Form of Original Issue Discount Senior Secured Debentures dated March 3, 2023
4.4*	Form of JGB Warrant
4.5*	Form of Omnia Warrant
10.1††	License Agreement dated March 6, 2009 between North Carolina State University and 22nd Century Limited, LLC (incorporated by reference to Exhibit 10.21 to the Company's Form S-1 registration statement filed with the Commission on August 26, 2011).
10.1.1	Amendment dated August 9, 2012 to License Agreement dated March 6, 2009 between North Carolina State University and 22nd Century Limited, LLC (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed with the Commission on August 20, 2012).
10.2	Letter Agreement between the Company and North Carolina State University dated November 22, 2011 (incorporated by reference to Exhibit 10.1 to the Company's Form 8-K filed with the Commission on November 23, 2011).
10.3†	Form of Executive Restricted Stock Unit Award under 2014 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.15 of the Company's Annual Report on Form 10-K filed with the Commission on March 6, 2019).
10.4†	Form of Director Restricted Stock Unit Award under 2014 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.16 of the Company's Annual Report on Form 10-K filed with the Commission on March 6, 2019).

10.5†††	Framework Collaborative Research Agreement, dated as of April 3, 2019, between KeyGene N.V. and 22nd Century Group, Inc. (incorporated by reference to Exhibit 10.1 of the Company's Quarterly Report on Form 10-Q filed with the Commission on May 7, 2019).
10.6†	Employment Agreement between the Company and James Mish (incorporated by reference to exhibit 10.1 of the Company's Current Report on Form 8-K filed with the Commission on June 3, 2020).
10.7†	Employment Agreement between the Company and John Franzino (incorporated by reference to exhibit 10.2 of the Company's Current Report on Form 8-K filed with the Commission on June 3, 2020).
10.8†	22nd Century Group, Inc. 2021 Omnibus Incentive Plan (incorporated by reference from Appendix A to the Company's definitive proxy statement filed April 5, 2021)
10.9†	Form of Option Award Agreement under 22nd Century Group, Inc. 2021 Omnibus Incentive Plan (incorporated by reference to exhibit 10.2 of the Company's Current Report on Form 8-K filed with the Commission on May 21, 2021).
10.10†	Form of Executive RSU Award Agreement under 22nd Century Group, Inc. 2021 Omnibus Incentive Plan (incorporated by reference to exhibit 10.3 of the Company's Current Report on Form 8-K filed with the Commission on May 21, 2021).
10.11†	Form of Director RSU Award Agreement under 22nd Century Group, Inc. 2021 Omnibus Incentive Plan (incorporated by reference to exhibit 10.4 of the Company's Current Report on Form 8-K filed with the Commission on May 21, 2021).
10.12†††	First Amended and Restated Framework Collaborative Research Agreement between 22nd Century Group, Inc. and Keygene N.V. dated April 16, 2021 (incorporated by reference to exhibit 10.1 of the Company's Form 10-Q filed with the Commission on August 5, 2021).
10.13	Securities Exchange Agreement between 22nd Century Group, Inc. and PLS, Exactus, Inc. dated June 30, 2021 (incorporated by reference to exhibit 10.3 of the Company's Form 10-Q filed with the Commission on August 5, 2021).
10.14†	Employment Agreement between the Company and R. Hugh Kinsman (incorporated by reference to exhibit 10.1 of the Company's Current Report on Form 8-K filed with the Commission on June 15, 2022).
10.15†*	Employment Agreement between the Company and John J. Miller dated November 11, 2022
10.16†	22nd Century Group, Inc. 2014 Omnibus Incentive Plan, as amended and restated (incorporated by reference from Appendix A to the Company's definitive proxy statement filed on March 22, 2019)
10.17†*	Employment Agreement between the Company and Peter Ferola dated September 20, 2022
10.18*	Securities Purchase Agreement dated March 3, 2023 with each of the purchasers party thereto and JGB Collateral, LLC, a Delaware limited liability company, as collateral agent for the Purchasers
10.19*	Subordinated Promissory Noted dated March 3, 2023
21.1*	Subsidiaries
23.1*	Consent of Freed Maxick CPAs, P.C.

31.1*	Section 302 Certification.
31.2*	Section 302 Certification.
32.1*	Written Statement of Principal Executive Officer and Chief Financial Officer pursuant to 18.U.S.C §1350.
101*	Interactive data files formatted in XBRL (eXtensible Business Reporting Language): (i) the Consolidated Balance Sheets, (ii) the Consolidated Statements of Operations, (iii) the Consolidated Statements of Cash Flows, and (iv) the Notes to the Consolidated Financial Statements.
101.INS XBRL	Instance Document*
101.SCH XBRL	Taxonomy Extension Schema Document*
101.CAL XBRL	Taxonomy Extension Calculation Linkbase Document*
101.DEF XBRL	Taxonomy Extension Definition Linkbase Document*
101.LAB XBRL	Taxonomy Extension Label Linkbase Document*
101.PRE XBRL	Taxonomy Extension Presentation Linkbase Document*
Exhibit 104	Cover Page Interactive Data File – The cover page interactive data file does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document*

* Filed herewith.

† Management contract or compensatory plan, contract or arrangement.

†† Certain portions of the exhibit have been omitted pursuant to a confidential treatment order. An unredacted copy of the exhibit has been filed separately with the United States Securities and Exchange Commission pursuant to the request for confidential treatment.

†††Certain portions of the exhibit have been omitted pursuant Regulation S-K Item 601(b) because it is both (i) not material to investors and (ii) likely to cause competitive harm to the Company is publicly disclosed.

Item 16. Form 10-K Summary.

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

22nd CENTURY GROUP, INC.

Date: March 9, 2023 By: /s/ James A. Mish
James A. Mish
Chief Executive Officer and Director
(Principal Executive Officer)

Date: March 9, 2023 By: /s/ R. Hugh Kinsman
R. Hugh Kinsman
Chief Financial Officer
(Principal Accounting and Financial Officer)

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Date: March 9, 2023 By: /s/ Nora B. Sullivan
Nora B. Sullivan
Director

Date: March 9, 2023 By: /s/ Richard M. Sanders
Richard M. Sanders
Director

Date: March 9, 2023 By: /s/ Clifford B. Fleet
Clifford B. Fleet
Director

Date: March 9, 2023 By: /s/ Roger D. O'Brien
Roger D. O'Brien
Director

Date: March 9, 2023 By: /s/ Dr. Michael Koganov
Dr. Michael Koganov
Director

Date: March 9, 2023 By: /s/ Anthony Johnson
Anthony Johnson
Director

Date: March 9, 2023 By: /s/ Lucille S. Salhany
Lucille S. Salhany
Director

Exhibit 4.3
EXECUTION VERSION

NEITHER THIS SECURITY NOR THE SECURITIES ISSUABLE HEREUNDER HAVE BEEN REGISTERED WITH THE SECURITIES AND EXCHANGE COMMISSION OR THE SECURITIES COMMISSION OF ANY STATE IN RELIANCE UPON AN EXEMPTION FROM REGISTRATION UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"), AND, ACCORDINGLY, MAY NOT BE OFFERED OR SOLD EXCEPT PURSUANT TO AN EFFECTIVE REGISTRATION STATEMENT UNDER THE SECURITIES ACT OR PURSUANT TO AN AVAILABLE EXEMPTION FROM, OR IN A TRANSACTION NOT SUBJECT TO, THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT AND IN ACCORDANCE WITH APPLICABLE STATE SECURITIES LAWS AS EVIDENCED BY A LEGAL OPINION OF COUNSEL TO THE TRANSFEROR TO SUCH EFFECT, THE SUBSTANCE OF WHICH SHALL BE REASONABLY ACCEPTABLE TO THE COMPANY. THIS SECURITY AND THE SECURITIES ISSUABLE HEREUNDER MAY BE PLEDGED IN CONNECTION WITH A BONA FIDE MARGIN ACCOUNT OR OTHER LOAN WITH A FINANCIAL INSTITUTION THAT IS AN "ACCREDITED INVESTOR" AS DEFINED IN RULE 501(a) UNDER THE SECURITIES ACT OR OTHER LOAN SECURED BY SUCH SECURITIES TO THE EXTENT PERMITTED UNDER THE SECURITIES PURCHASE AGREEMENT DATED MARCH 3, 2023, AMONG THE COMPANY AND THE PURCHASERS SIGNATORY THERETO.

THIS DEBENTURE HAS BEEN ISSUED WITH ORIGINAL ISSUE DISCOUNT ("OID"). PURSUANT TO TREASURY REGULATION §1.1275-3(b)(1), THE CHIEF FINANCIAL OFFICER OF THE COMPANY, BEGINNING TEN (10) DAYS AFTER THE ISSUANCE DATE OF THIS DEBENTURE, WILL PROMPTLY MAKE AVAILABLE TO THE HOLDER UPON REQUEST THE INFORMATION DESCRIBED IN TREASURY REGULATION §1.1275-3(b)(1)(i). THE CHIEF FINANCIAL OFFICER OF THE COMPANY MAY BE REACHED AT TELEPHONE NUMBER (716) 270-1523.

Original Issue Date: March 3, 2023

$_____

7% ORIGINAL ISSUE DISCOUNT
SENIOR SECURED DEBENTURE
DUE MARCH 3, 2026

THIS **7% ORIGINAL ISSUE DISCOUNT SENIOR SECURED DEBENTURE** is one of a series of duly authorized and validly issued 7% Original Issue Discount Senior Secured Debentures of 22nd Century Group, Inc., a Nevada corporation, (the "***Company***"), having its principal place of business at 500 Seneca Street, Suite 507, Buffalo, New York 14204 (this debenture, as amended, restated, supplemented or otherwise modified from time to time, the "***Debenture***" and collectively with the other debentures of such series, the "***Debentures***") and is issued pursuant to the Purchase Agreement (as defined below).

FOR VALUE RECEIVED, the Company promises to pay in cash to _____, or its registered assigns (the "***Holder***"), or shall have paid pursuant to the terms hereunder, the principal sum of $_____ on March 3, 2026 (the "***Maturity Date***") or such earlier date as this Debenture is required or permitted to be repaid as provided hereunder, and to pay interest to the Holder on the aggregate then outstanding principal amount of this Debenture in accordance with the provisions hereof. This Debenture is subject to the following additional provisions:

Section 1. Definitions. For the purposes hereof, in addition to the terms defined elsewhere in this Debenture, (a) capitalized terms not otherwise defined herein shall have the

meanings set forth in the Purchase Agreement and (b) the following terms shall have the following meanings:

"***Agent***" means _____, a Delaware limited liability company.

"***Applicable Interest Rate***" means an annual rate equal to 7.00%; provided, however, following the occurrence and during the continuance of an Event of Default, the "***Applicable Interest Rate***" shall automatically, without notice or any other action required by Holder, mean an annual rate equal to 12.00%.

"***Available Advance Shares***" shall have the meaning set forth in ***Section 5(a)(iv)***.

"***Bankruptcy Event***" means any of the following events: (a) the Company or any Subsidiary thereof commences a case or other proceeding under any bankruptcy, reorganization, arrangement, adjustment of debt, relief of debtors, dissolution, insolvency or liquidation or similar law of any jurisdiction relating to the Company or any Subsidiary thereof, (b) there is commenced against the Company or any Subsidiary thereof any such case or proceeding that is not dismissed within sixty (60) days after commencement, (c) the Company or any Subsidiary thereof is adjudicated insolvent or bankrupt or any order of relief or other order approving any such case or proceeding is entered, (d) the Company or any Subsidiary thereof suffers any appointment of any custodian or the like for it or any substantial part of its property that is not discharged or stayed within sixty (60) calendar days after such appointment, (e) the Company or any Subsidiary thereof makes a general assignment for the benefit of creditors, (f) the Company or any Subsidiary thereof calls a meeting of its creditors with a view to arranging a composition, adjustment or restructuring of its debts, (g) the Company or any Subsidiary thereof, by any act or failure to act, expressly indicates its consent to, approval of or acquiescence in any of the foregoing or takes any corporate or other action for the purpose of effecting any of the foregoing, or (h) the Company or any Subsidiary admits in writing its inability, or is otherwise unable, to pay its debts generally as they become due.

"***Beneficial Ownership Limitation***" shall have the meaning set forth in ***Section 5(g)***.

"***Blocked Account***" shall have the meaning set forth in ***Section 7(c)***.

"***Blocked Account Agreement***" shall have the meaning set forth in ***Section 7(c)***.

"***Bloomberg***" means Bloomberg, L.P.

"***Board of Directors***" means the board of directors of the Company.

"***Buy-In***" shall have the meaning set forth in ***Section 5(d)***.

"***Buy-In Price***" shall have the meaning set forth in ***Section 5(d)***.

"***Change of Control Put Period***" has the meaning set forth in ***Section 3(b)***.

"***Change of Control Put Right***" has the meaning set forth in ***Section 3(b)***.

"***Change of Control Transaction***" means the occurrence after the date hereof of any of (a) an acquisition after the date hereof by an individual or legal entity or "group" (as described in *Rule 13d-5(b)(1)* promulgated under the Exchange Act) of effective control (whether through legal or beneficial ownership of capital stock of the Company, by contract or otherwise) of in excess of 50% of the voting securities of the Company, (b) the Company merges into or consolidates with any other Person, or any Person merges into or consolidates with the Company and, after giving effect to such transaction, the stockholders of the Company immediately prior to such transaction own less than 50% of the aggregate voting power of the Company or the successor entity of such transaction, or (c) the Company Disposes of all or substantially all of its assets to another Person.

"***Collateral***" shall have the meaning given such term in the Security Agreement.

"***Commission***" means the U.S. Securities Exchange Commission.

"***Common Stock Equivalents***" means any securities of the Company or the Subsidiaries which would entitle the holder thereof to acquire at any time Common Stock, including, without limitation, any debt, preferred stock, right, option, warrant or other instrument that is at any time convertible into or exercisable or exchangeable for, or otherwise entitles the holder thereof to receive, Common Stock.

"***Company***" shall have the meaning given such term in the preambles hereto.

"***Company Counsel***" means Greenberg Traurig, P.A., 401 East Las Olas Boulevard Suite 2000, Fort Lauderdale, FL 33301.

"***Debenture(s)***" shall have the meaning given such term in the preambles hereto.

"***Debenture Register***" shall have the meaning set forth in ***Section 2(d)***.

"***Debenture Shares***" means all Stock Payment Shares, Monthly Redemption Advance Shares, Interest Advance Shares and Interest True-Up Shares.

"***Delivery Date***" means (a) with respect to Stock Payment Shares, the applicable Holder Redemption Payment Date, (c) with respect to Interest True-Up Shares, the applicable Interest Payment Date, (d) with respect to Interest Advance Shares, the applicable Interest Advance Shares Date, and (e) with respect to Monthly Redemption Advance Shares, the applicable Monthly Redemption Advance Date.

"***Delivery Failure***" shall have the meaning set forth in ***Section 5(d)***.

"***Dispose***" and "***Disposition***" means the sale, transfer, license, lease or other disposition (including any sale and leaseback transaction or by way of a merger) of any assets or property by any Person, including, without limitation, any sale, assignment, transfer or other disposal, with or without recourse, of any notes or accounts receivable or any rights and claims associated therewith, in each case, whether or not the consideration

therefor consists of cash, securities or other assets owned by the acquiring Person, excluding any sales of inventory in the ordinary course of business on ordinary business terms.

"***Disqualified Stock***" shall mean, with respect to any person, any Equity Interests of such person that, by its terms (or by the terms of any security or other Equity Interests into which it is convertible or for which it is exchangeable) or upon the happening of any event or condition (a) matures or is mandatorily redeemable, pursuant to a sinking fund obligation or otherwise (except as a result of a Change of Control Transaction so long as any rights of the holders thereof upon the occurrence of a Change of Control Transaction shall be subject to the prior repayment in full of the Debentures), (b) is redeemable at the option of the holder thereof, in whole or in part, (c) provides for the scheduled payments of dividends in cash, or (d) is or becomes convertible into or exchangeable for Indebtedness or any other Equity Interests that would constitute Disqualified Stock.

"***Domestic Subsidiary***" means any Subsidiary that is incorporated or organized under the laws of any state of the United States or the District of Columbia, other than any such Subsidiary owned directly or indirectly by a Foreign Subsidiary.

"***DTC***" means the Depository Trust Company.

"***Equity Conditions***" means, during the period in question, (a) all of the shares of Common Stock issued, issuable or required to be issued pursuant to the Transaction Documents may be resold pursuant to *Rule 144* without volume or manner-of-sale restrictions as set forth in a written opinion letter of Company Counsel to such effect, addressed and acceptable to the Transfer Agent and the Holder, provided, however, this condition shall not be deemed satisfied during (1) any period that the Company is not in compliance with the current public information requirements under *Rule 144* or any information requirements of paragraph (i) of *Rule 144*, if applicable, or (2) any *Rule 12b-25* extension period with respect to any quarterly or annual report of the Company that is not filed by the prescribed due date therefor (for the avoidance of doubt, without giving effect to any extension of such due date), (b) the Common Stock is trading on a Trading Market and all of shares of Common Stock issued, issuable or required to be issued pursuant to the Transaction Documents are listed or quoted for trading on such Trading Market (and the Company believes, in good faith, that trading of the Common Stock on a Trading Market will continue uninterrupted for the foreseeable future) and the issuance of such shares of Common Stock pursuant to the Transaction Documents would not violate the rules and regulations of any such Trading Market, (c) there is a sufficient number of authorized but unissued and otherwise unreserved shares of Common Stock for the issuance of all of the shares then issuable pursuant to the Transaction Documents, (d) there is no existing Event of Default and no existing event which, with the expiration of cure period or the giving of notice, would constitute an Event of Default, (e) the issuance of the shares of Common Stock in question to the Holder would not violate the limitations set forth in ***Section 5(g)*** or ***Section 5(h)***, (f) there has been no public announcement of a pending or proposed Fundamental Transaction or Change of Control Transaction that has not been consummated, (g) the applicable Holder is not in possession of any information provided by or on behalf of the Company that constitutes, or may constitute, material non-

public information, (h) the VWAP of the Common Stock is at least $0.75 per share (appropriately adjusted for any stock split, stock dividend, stock combination, stock buy-back or other similar transaction) on each Trading Day, (i) the Common Stock is DTC eligible (and not subject to "chill") and the Company's transfer agent is participating in DTC's Fast Automated Securities Transfer Program; and (j) the Holder, in its sole determination, are able to engage in transactions in Common Stock on the Principal Market through reputable broker-dealers or otherwise on terms that are economical and commercially reasonable to the Holder (it being understood, without limiting the foregoing, that if brokerage commissions and/or holders' other out-of-pocket costs would generally exceed, as determined by the holders in good faith, the difference between the market price for the Common Stock and the Stock Payment Price, such a situation would not be economical or commercially reasonable).

"***Equity Conditions Failure***" shall have the meaning set forth in ***Section 5(a)(iii)***.

"***Equity Interests***" means, with respect to any Person, all of the shares of capital stock of (or other ownership or profit interests in) such Person, all of the warrants, options or other rights for the purchase or acquisition from such Person of shares of capital stock of (or other ownership or profit interests in) such Person, all of the securities convertible into or exchangeable for shares of capital stock of (or other ownership or profit interests in) such Person or warrants, rights or options for the purchase or acquisition from such Person of such shares (or such other interests), and all of the other ownership or profit interests in such Person (including partnership, member or trust interests therein), whether voting or nonvoting, and whether or not such shares, warrants, options, rights or other interests are outstanding on any date of determination.

"***Event of Default***" shall have the meaning set forth in ***Section 8(a)***.

"***Exchange Act***" means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

"***Exchange Cap***" shall have the meaning set forth in ***Section 5(h)***.

"***Exchange Cap Allocation***" shall have the meaning set forth in ***Section 5(h).***

"Exit Payment" has the meaning set forth in ***Section 2(e)***.

"***Foreign Subsidiary***" means any Subsidiary that is not a Domestic Subsidiary.

"***Fundamental Transaction***" means (a) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (b) the Company, directly or indirectly, effects any sale, lease, exclusive license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (c) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock, (d) the Company,

directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property, (e) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off or scheme of arrangement) with another Person whereby such other Person acquires more than 50% of the outstanding shares of Common Stock (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or Affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination).

"***Governmental Authority***" means any national, supranational, federal, state, county, provincial, local, municipal or other government or political subdivision thereof (including any Regulatory Authority), whether domestic or foreign, and any agency, authority, commission, ministry, instrumentality, regulatory body, court, tribunal, arbitrator, central bank or other Person exercising executive, legislative, judicial, taxing, regulatory or administrative powers or functions of or pertaining to any such government.

"***Holder***" shall have the meaning given such term in the preambles hereto.

"***Holder Redemption Amount***" shall have the meaning set forth in ***Section 5(a)(i)***.

"***Holder Redemption Notice***" shall have the meaning set forth in ***Section 5(a)(i)***.

"***Holder Redemption Payment Date***" shall have the meaning set forth in ***Section 5(a)(i)***.

"***Holder Redemption Right***" shall have the meaning set forth in ***Section 5(a)(i)***.

"***Indebtedness***" of a Person shall include (a) all obligations for borrowed money or the deferred purchase price of property or services (excluding trade credit, trade accounts payable and accrued expenses incurred in the ordinary course of business, together with any credit card indebtedness incurred to pay any such trade credit, trade accounts payable and accrued expenses), (b) all obligations evidenced by bonds, debentures, notes, or other similar instruments and all reimbursement or other obligations in respect of letters of credit (other than trade letters of credit issued in the ordinary course of business), surety bonds, bankers acceptances, current swap agreements, interest rate hedging agreements, interest rate swaps or other financial products, (c) all capital lease obligations (as determined in accordance with GAAP), (d) all obligations or liabilities secured by a Lien on any asset of such Person, irrespective of whether such obligation or liability is assumed by such Person, (e) any obligation arising with respect to any other transaction that is the functional equivalent of borrowing but which does not constitute a liability on the balance sheets of such Person (excluding trade credit, trade accounts payable and accrued expenses incurred in the ordinary course of business, together with any credit card indebtedness incurred to pay any such trade credit, trade accounts payable and accrued expenses), (f) Disqualified Stock, and (g) any obligation guaranteeing or intended to guarantee (whether directly or

indirectly guaranteed, endorsed, co-made, discounted or sold with recourse) any of the foregoing obligations of any other Person. Notwithstanding anything to the contrary set forth herein, (i) notwithstanding any change in GAAP after the Original Issue Date that would require lease obligations that would be treated as operating leases as of the Original Issue Date to be classified and accounted for as capital leases or otherwise reflected on the Company's consolidated balance sheet, such obligations shall continue to be treated as operating leases and shall be excluded from the definition of Indebtedness and (ii) any lease that was entered into after the Original Issue Date that would have been considered an operating lease under GAAP in effect as of the Original Issue Date shall be treated as an operating lease for all purposes under this Debenture, and obligations in respect thereof shall be excluded from the definition of Indebtedness.

"***Interest Advance Shares***" has the meaning set forth in ***Section 2(a)***.

"***Interest Advance Shares Date***" has the meaning set forth in ***Section 2(a)***.

"***Interest Notice Period***" means, with respect to each Interest Payment Date, the twenty (20) consecutive Trading Days immediately preceding such Interest Payment Date.

"***Interest Payment Date***" shall have the meaning set forth in ***Section 2(a)***.

"***Interest Share Amount***" shall have the meaning set forth in ***Section 2(a)***.

"***Interest True-Up Shares***" has the meaning set forth in ***Section 2(b).***

"***Investments***" means, as to any Person, any direct or indirect acquisition or investment by such Person, whether by means of (a) the purchase or other acquisition (including by merger) of Equity Interests of another Person, (b) a loan, advance or capital contribution to, guarantee or assumption of debt of, or purchase or other acquisition of any other debt or interest in, another Person, or (c) the purchase or other acquisition (in one transaction or a series of transactions) of assets of another Person that constitute a business unit or all or a substantial part of the business of, such Person.

"***Lien***" means any mortgage, deed of trust, pledge, hypothecation, assignment for security, security interest, encumbrance, levy, lien or charge of any kind, whether voluntarily incurred or arising by operation of law or otherwise, against any property, any conditional sale or other title retention agreement, and any lease in the nature of a security interest.

"***Material Adverse Effect***" means a material adverse effect upon: (a) the business, operations, properties, assets or financial condition of the Company and its Subsidiaries taken as a whole; or (b) the ability of the Company or any Subsidiary to perform or pay any of its respective obligations in accordance with the terms of the Transaction Documents, or the ability of Agent or Holder to enforce any of its rights or remedies with respect to such obligations; or (c) the Collateral or Agent's Liens on the Collateral or the priority of such Liens (except, solely with respect to this clause (c) to the extent resulting from any action or inaction of the Agent or any Holder); provided, that, solely for the purposes of ***Section 8(a)(xviii)***, any effect resulting from any of the following shall not be

considered when determining whether a Material Adverse Effect shall have occurred: (i) conditions affecting generally the United States economy, including the financial, credit, or securities markets, (ii) acts of terrorism, armed hostilities or war, including civil unrest or cyberattacks, (iii) any change in law or GAAP, or the interpretation thereof, (iv) the execution and delivery of the Purchase Agreement or the Debentures, the public announcement or the pendency of Purchase Agreement or the Debentures or the pendency or consummation of the transactions contemplated by the Purchase Agreement or the Debentures and the taking of any action required by the Purchase Agreement or the Debentures, (v) natural disasters or acts of God, including pandemics, (vi) any changes in conditions generally affecting the industry in which the Company and its Subsidiaries operate, or (vii) fluctuations in the trading price of shares of the capital stock of the Company (it being understood and agreed that the circumstances underlying any such fluctuations may, unless otherwise excluded by another clause in this definition, be taken into account in determining whether a Material Adverse Effect has occurred or would be reasonably likely to occur), except, in the case of clauses (i), (ii) and (vi), to the extent (and only to the extent) that the Company and its Subsidiaries are materially disproportionately impacted, or would reasonably be expected to be materially disproportionately impacted, by such events in comparison to others in the industry in which the Company and its Subsidiaries operate.

"***Maturity Date***" shall have the meaning given such term in the preambles hereto.

"***Monthly Allowance***" means, with respect to each calendar month commencing with the calendar month of March, 2024, a portion of the principal amount of this Debenture equal to two (2%) percent of the original principal amount of this Debenture.

"***Monthly Redemption Advance Date***" shall have the meaning set forth in ***Section 5(a)(ii)***.

"***Monthly Redemption Advance Shares***" shall have the meaning set forth in ***Section 5(a)(ii)***.

"***Needle Rock Ranch***" means the approximately 224 acres of real property located in Delta County, Colorado having an address of 41437 Cottonwood Creek Rd, Crawford, Colorado 81415 and more particularly described in the Deed of Trust.

"***New York Courts***" shall have the meaning set forth in ***Section 9(d)***.

"***Original Issue Date***" means March 3, 2023, regardless of any transfers of the Debenture or amendments to the Debenture and regardless of the number of instruments which may be issued to evidence the Debenture.

"***Permitted Dispositions***" means (a) sales of inventory in the ordinary course of business, (b) the sale, lease, sub-lease, assignment, conveyance, transfer, license, exchange or disposition of inventory or services or other assets, including the non-exclusive license (as licensor or sublicensor) of intellectual property, in each case, in the ordinary course of business consistent with past practice, (c) the sale or discount, in each case without recourse and in the ordinary course of business consistent with past practice, by the Company or its

Subsidiaries of accounts receivable or notes receivable arising in the ordinary course of business, but only in connection with the compromise or collection thereof or in connection with the bankruptcy or reorganization of the applicable account debtors and dispositions of any securities or other Investments received in any such bankruptcy or reorganization, (d) the sale, lease, sub-lease, assignment, conveyance, transfer, license, exchange or disposition of used, worn out, obsolete or surplus property by the Company or its Subsidiaries, including the abandonment or other disposition of intellectual property, in each case, which, in the reasonable judgment of the Company, is no longer economically practicable to maintain or useful in the conduct of the business of the Company and its Subsidiaries, taken as a whole, (e) terminations of leases, subleases, licenses and sublicenses in the ordinary course of business, (f) the use or other disposition of cash and cash equivalents in the ordinary course of business and (g) other transfers of assets having a fair market value of not more than $250,000 in the aggregate during any fiscal year.

"***Permitted Indebtedness***" means (a) the Indebtedness evidenced by the Debentures, (b) capital lease obligations and purchase money indebtedness of up to One Hundred Fifty Thousand Dollars $150,000, in the aggregate, at any one time outstanding incurred in connection with the acquisition of capital assets and lease obligations with respect to newly acquired or leased assets, provided that such lease obligations and purchase money indebtedness are only recourse to the assets being acquired or leased, (c) Subordinated Indebtedness, (d) other Indebtedness outstanding on the Original Issue Date identified on ***Schedule A*** hereto, (e) Indebtedness of the Company or its Subsidiaries in an aggregate principal amount not to exceed $500,000 at any one time outstanding and (f) any guarantees of any Permitted Indebtedness.

"***Permitted Investment***" means: (a) Investments existing on, or contemplated to occur following, the Original Issue Date which are disclosed on ***Schedule B***; (b) (i) U.S. Treasury bills, notes, and bonds maturing within 1 year from the date of acquisition thereof, (ii) U.S. agency and government-sponsored entity debt obligations maturing within one 1 year from the date of acquisition thereof, and (iii) U.S. Securities and Exchange Commission-registered money market funds that have a minimum of $1,000,000,000 in assets, (c) Investments consisting of notes receivable of, or prepaid royalties and other credit extensions and advances, to customers, suppliers, contract manufacturers, and/or licensors who are not Affiliates, in the ordinary course of business, provided that this subparagraph (c) shall not apply to Investments of the Company in any Subsidiary, (d) Investments in newly-formed or newly-acquired Domestic Subsidiaries, provided that each such Domestic Subsidiary promptly executes a joinder to the Subsidiary Guaranty and a joinder to the Security Agreement, in each case, in a form reasonably acceptable to the Holder, (e) Investments in Foreign Subsidiaries either (x) in an aggregate amount not in excess of $500,000 in the aggregate during any fiscal year, or (y) that are otherwise approved in advance by the Agent in writing, (f) Investments by the Company or any Qualified Subsidiary in any Qualified Subsidiary, (g) Investments received in satisfaction or partial satisfaction thereof from financially troubled account debtors or pursuant to any plan of reorganization or similar arrangement upon the bankruptcy or insolvency of such account debtors, (h) deposits, prepayments and other credits to suppliers made in the ordinary course of business or consistent with the past practices of the Company and its Subsidiaries, (i) Investments made in the ordinary course of business consisting of

negotiable instruments held for collection in the ordinary course of business and lease, utility and other similar deposits in the ordinary course of business, (j) guarantees or other contingent obligations constituting Permitted Indebtedness, (k) advances, loans or extensions of credit to officers, members of the Board of Directors, and employees of the Company or any of its Subsidiaries in the ordinary course of business for travel, entertainment or relocation, out-of-pocket or other business-related expenses, (l) Indebtedness owing to insurance companies and insurance brokers incurred in connection with the financing of insurance premiums in the ordinary course of business and (m) additional Investments that do not exceed $500,000 in the aggregate in any fiscal year.

"***Permitted Lien***" means the individual and collective reference to the following: (a) Liens for taxes, assessments and other governmental charges or levies not yet due or Liens for taxes, assessments and other governmental charges or levies being contested in good faith and by appropriate proceedings for which adequate reserves (in the good faith judgment of the management of the Company) have been established in accordance with GAAP, (b) Liens imposed by law which were incurred in the ordinary course of business of the Company or any of its Subsidiaries, such as carriers', warehousemen's and mechanics' Liens, statutory landlords' Liens, and other similar Liens arising in the ordinary course of business of the Company or any of its Subsidiaries, and which (x) do not individually or in the aggregate materially detract from the value of the property or assets subject to such Lien or materially impair the use thereof in the operation of the business of the Company and its consolidated Subsidiaries or (y) are being contested in good faith by appropriate proceedings, which proceedings have the effect of preventing for the foreseeable future the forfeiture or sale of the property or asset subject to such Lien, (c) Liens in favor of the Agent, (d) Liens for reasonable and customary banking fees granted to banks or other financial institutions in the ordinary course of business in connection with, and which solely encumber, deposit, disbursement or concentration accounts (other than in connection with borrowed money) maintained with such banks or financial institutions, (e) Liens in respect of any Indebtedness referred to in clause (b) of the definition of "Permitted Indebtedness", (f) pledges or deposits in the ordinary course of business in connection with workers' compensation, unemployment insurance and other social security legislation, (g) covenants, conditions, easements, rights-of-way, building codes, restrictions (including zoning restrictions), encroachments, licenses, protrusions and other similar encumbrances, minor title defects or irregularities, in each case affecting real estate assets and that do not, individually or in the aggregate materially interfere with the ordinary conduct of the business of the Company and its Subsidiaries or materially affect the value of or current and contemplated uses of the real estate assets, (h) any interest or title of a lessor, sub-lessor, licensor or sub-licensor under leases, subleases, licenses or sublicenses entered into by the Company or any of its Subsidiaries in the ordinary course of business, (i) purported Liens evidenced by the filing of precautionary UCC filings in connection with operating leases and subleases in the ordinary course of business, (j) Liens securing obligations of the Company and its Subsidiaries not to exceed $500,000 at any one time outstanding, (k) Liens on insurance policies and proceeds thereof securing obligations incurred to pay annual insurance premiums or Liens on premium refunds in respect of insurance policies and proceeds thereof granted in favor of insurance companies, in each case, in the ordinary course of business, (l) deposits, prepayments and other credits to suppliers and landlords made in the ordinary course of business and consistent with the

past practices of the Company and its Subsidiaries in an aggregate amount not to exceed $250,000 at any time outstanding, and (m) Liens existing on the Original Issue Date which are disclosed on ***Schedule C***.

"***Prepayment Amount***" means, with respect to any payment of this Debenture prior to the Maturity Date pursuant to ***Section 3(a)***, ***Section 3(b)*** or ***Section 8(b)***, the entire outstanding principal balance (including, for the avoidance of doubt, any original issue discount) of this Debenture, all accrued and unpaid interest thereon, and all other amounts due and payable under this Debenture, together with the Prepayment Premium.

"***Prepayment Date***" shall have the meaning set forth in ***Section 3(a)***.

"***Prepayment Notice***" shall have the meaning set forth in ***Section 3(a)***.

"***Prepayment Notice Date***" shall have the meaning set forth in ***Section 3(a)***.

"***Prepayment Period***" shall have the meaning set forth in ***Section 3(a)***.

"***Prepayment Premium***" means, in connection with any prepayment of this Debenture in full prior to the Maturity Date pursuant to ***Section 3(a)***, ***Section 3(b)*** or ***Section 8(b)***, an amount equal to three percent (3%) of the principal amount of this Debenture prepaid on such date.

"***Principal Market***" means the Nasdaq Capital Market or such other Trading Market where the Common Stock is then listed or quoted.

"***Pro Rata Share***" means, with respect to the value or amount in question, the Holder's pro rata share thereof based on the outstanding principal balance of this Debenture relative to the aggregate outstanding principal balance of all Debentures.

"***Purchase Agreement***" means that certain Securities Purchase Agreement, dated as of March 3, 2023, among the Company and the purchasers signatory thereto (including the original Holder), as amended, modified or supplemented from time to time in accordance with its terms.

"***Qualified Subsidiary***" means any Subsidiary that has guaranteed the Company's obligations hereunder and granted to the Holder or the Agent a first ranking (subject to Permitted Liens) security interest in substantially all of the assets of such Subsidiary.

"***Repudiation***" shall have the meaning set forth in ***Section 5(c)***.

"***Revenue Target***" shall have the meaning set forth in ***Section 7(d)***.

"***Securities Act***" means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

"***Stock Off***" shall have the meaning set forth in ***Section 5(a)(ii)***.

"***Stock On***" shall have the meaning set forth in ***Section 5(a)(ii)***.

"***Stock On/Off Notice***" shall have the meaning set forth in ***Section 5(a)(ii)***.

"***Stock Payment Price***" means, with respect to the Monthly Redemption Advance Date, the date of the Holder Redemption Notice, Interest Shares Advance Date or Interest Payment Date in question, the lesser of (a) 85% of the average of the daily VWAP for each of the twenty (20) consecutive Trading Days immediately preceding such date and (b) 90% of the VWAP for the Trading Day immediately preceding such date.

"***Stock Payment Shares***" shall have the meaning set forth in ***Section 5(a)(iv)***.

"***Subordinated Indebtedness***" means (i) Indebtedness in respect of the subordinated Promissory Note in the principal amount of $2,700,000 made by ESI Holdings, LLC payable to Omnia Ventures, Inc., and (ii) any other Indebtedness that is expressly subordinated to the Indebtedness to the Holder pursuant to a written subordination agreement and/or inter-creditor agreement satisfactory to the Holder in its sole discretion.

"***Subsidiary***" means an entity, whether corporate, partnership, limited liability company, joint venture or otherwise, in which the Company owns or controls a majority of the total voting power of the outstanding voting securities, including each entity listed on ***Schedule D*** hereto.

"***Successor Entity***" shall have the meaning set forth in ***Section 6***.

"***Trading Day***" means a day on which the principal Trading Market is open for trading.

"***Trading Market***" means any of the following markets or exchanges on which the Common Stock is listed or quoted for trading on the date in question: the NYSE American, the Nasdaq Global Market, the Nasdaq Global Select Market, the New York Stock Exchange or the Principal Market (or any successors to any of the foregoing).

"***Volume Limitation***" means 15% of the aggregate trading volume of the Common Stock on the Principal Market (or other applicable Trading Market) over the twenty (20) consecutive Trading Day period ending on the Trading Day immediately preceding the date of any Holder Redemption Notice or the commencement of any Interest Notice Period.

"***VWAP***" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg (based on a Trading Day from 9:30 a.m. (local time in New York City, New York) to 4:00 p.m. (local time in New York City, New York)), (b) if NASDAQCM is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on NASDAQCM, (c) if the Common Stock is not then listed or quoted for trading on NASDAQCM and if prices for the Common

Stock are then reported in the "Pink Sheets" published by OTC Markets Group, Inc. (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holder and reasonably acceptable to the Company, the reasonable, actual and documented fees and reasonable, actual and documented out-of-pocket expenses of which shall be paid by the Company.

Section 2. Interest; Exit Payment.

a) **Payment of Interest in Cash or Common Stock**. The Company shall pay interest to the Holder on the aggregate then outstanding principal amount of this Debenture at the Applicable Interest Rate, payable monthly in arrears as of the last Trading Day of each calendar month and on the Maturity Date (each such date, an "***Interest Payment Date***") (if any Interest Payment Date is not a Business Day, then the applicable payment shall be due on the next succeeding Business Day), in cash or, at the Company's election in duly authorized, validly issued and fully paid shares of Common Stock at the Stock Payment Price on the Interest Payment Date, or a combination thereof (the amount to be paid in shares of Common Stock, the "***Interest Share Amount***"). Notwithstanding anything contained herein to the contrary, any payment of interest in shares of Common Stock may only occur if (i) all of the Equity Conditions have been met (unless waived by the Holder in writing) during the twenty (20) Trading Days immediately prior to the applicable Interest Payment Date and through and including the date such shares of Common Stock are actually issued to the Holder, (ii) the Company shall have given the Holder notice in accordance with the notice requirements set forth below and (iii) as to such Interest Payment Date, prior to such Interest Notice Period (but not more than three (3) Trading Days prior to the commencement of such Interest Notice Period), the Company shall have delivered to the Holder's or its broker's DTC account the number of shares of Common Stock to be applied against such Interest Share Amount equal to the quotient (such quotient of (x) and (y), the "***Interest Advance Shares***") of (x) the applicable Interest Share Amount divided by (y) the Stock Payment Price assuming for such purposes that the Interest Payment Date is the third (3rd) Trading Day immediately prior to the commencement of the Interest Notice Period (the "***Interest Advance Shares Date***"). In the event that the number of Interest Advance Shares or Interest True-Up Shares (in the aggregate with the number of Monthly Redemption Advance Shares and Stock Payment Shares, if any, issued to the holder during the applicable Interest Notice Period) exceeds the Volume Limit for any Interest Payment Date, or the delivery of Interest Advance Shares or Interest True Up Shares would cause the Beneficial Ownership Limitation to be exceeded, then the Company shall pay the portion of the Interest Share Amount that would be in excess of the Dollar Volume Limitation or would cause the Holder to exceed the Beneficial Ownership Limitation in cash.

b) **Company's Election to Pay Interest in Cash or Common Stock**. Subject to the terms and conditions herein, including the last sentence of ***Section 2(a)***, the decision whether to pay interest hereunder in cash, shares of Common Stock or a combination thereof shall be at the sole discretion of the Company. Subject to the last sentence of ***Section 2(a)***, prior to the commencement of any Interest Notice Period, the Company, if it

desires to make an election to pay any interest due on the related Interest Payment Date in shares of Common Stock or in a combination of cash and shares of Common Stock, shall deliver to the Holder a written notice of such election and setting forth the Interest Share Amount as to such Interest Payment Date, provided that the Company may indicate in such notice that the election contained in such notice shall apply to future Interest Payment Dates until revised by a subsequent notice. During any Interest Notice Period, the Company's election (whether specific to an Interest Payment Date or continuous) shall be irrevocable as to such Interest Payment Date. Subject to the aforementioned conditions, failure to timely deliver such written notice to the Holder shall be deemed an election by the Company to pay the interest on such Interest Payment Date in cash. On the Interest Payment Date, the Company shall issue to the Holder a number of shares of Common Stock (if any) ("***Interest True-Up Shares***") equal to the excess, if any, of (A) the Interest Share Amount divided by the Stock Payment Price for the Interest Payment Date over (B) the number of Interest Advance Shares actually issued to the Holder on the related Interest Advance Shares Date. With respect to any Interest Payment Date, to the extent that the number of Interest Advance Shares exceeds the quotient obtained by dividing the Interest Share Amount divided by the Stock Payment Price for the Interest Payment Date, then (x) the Holder will retain the excess Interest Advance Shares in partial satisfaction of the obligation of the Company to deliver Interest Advance Shares in respect of the next month on which the Company elects to pay interest in shares of Common Stock; and (y) such retained Interest Advance Shares will be taken into account for purposes of calculating clause (B) above with respect to such month.

c) **Exception for Interest on Holder Principal Redemption Amount**. Notwithstanding the foregoing, if the Holder exercises its Holder Redemption Right with respect to a Holder Redemption Amount for any calendar month, then accrued and unpaid interest on such Holder Redemption Amount shall be due on the related Holder Redemption Payment Date and will be paid in accordance with ***Section 5(a)*** and will not be subject to ***Section 2(a)*** and ***Section 2(b)***.

d) **Interest Calculations**. Interest shall be calculated on the basis of a 365-day (or, if applicable, a 366-day) year and the actual number of days elapsed, and shall accrue daily commencing on the Original Issue Date until payment in full of the outstanding principal (including, for the avoidance of doubt, any original issue discount), together with all accrued and unpaid interest, liquidated damages and other amounts which may become due hereunder, has been made. Interest hereunder will be paid to the Person in whose name this Debenture is registered on the records of the Company regarding registration and transfers of this Debenture (the "***Debenture Register***") or such Person's designee identified to the Company in writing.

e) **Exit Payment**. On the Maturity Date or any other date when the is Debenture is paid in full pursuant to ***Section 3(a)***, ***Section 3(b)***, ***Section 8(b)*** or otherwise, the Company will pay to the Holder an exit payment equal to five percent 5% of the original principal amount of this Debenture, which is $_____ (the "***Exit Payment***").

Section 3. Prepayment.

a) **Prepayment at the Option of the Company**. Subject to the provisions of this ***Section 3(a)***, at any time after March 3, 2024, the Company may deliver a notice to the Holder and the holders of the other outstanding Debentures (a "***Prepayment Notice***" and the date such notice is deemed delivered hereunder, the "***Prepayment Notice Date***") of its irrevocable election to redeem all, but not less than all, of the then outstanding principal amount of this Debenture and the other outstanding Debentures (including, for the avoidance of doubt, any original issue discount) for cash in an amount equal to the Prepayment Amount and the Exit Payment on the thirtieth (30th) Trading Day following the Prepayment Notice Date (such date, the "***Prepayment Date***", such thirty (30) Trading Day period, the "***Prepayment Period***"). The Prepayment Amount and the Exit Payment shall be due and payable in full in cash on the Prepayment Date. The Company covenants and agrees that, to the extent that this Debenture is Stock On, it will honor all Holder Redemption Notices, tendered from the time of delivery of the Prepayment Notice through the date all amounts owing thereon are due and paid in full. The Company will, concurrently with the delivery of the Prepayment Notice to the Holder, publicly announce its intention to prepay this Debenture by means of a Current Report on Form 8-K filed with the Commission. If any portion of Prepayment Amount shall not be paid by the Company by the Prepayment Date, interest shall accrue thereon at an interest rate equal to the lesser of ten percent (10%) per annum or the maximum rate permitted by applicable law until such amount is paid in full. Notwithstanding anything herein contained to the contrary, if any portion of the Prepayment Amount remains unpaid after the Prepayment Date, then the Holder may elect, by written notice to the Company given at any time thereafter, to invalidate such prepayment, *ab initio*. For the avoidance of doubt, the Company may not prepay this Debenture pursuant to this ***Section 3(a)*** prior to March 3, 2024.

b) **Prepayment at the Option of the Holder**. The Holder may require the Company to prepay the entire outstanding principal amount of this Debenture (including, for the avoidance of doubt, any original issue discount) for cash in an amount equal to the Prepayment Amount and the Exit Payment (the "***Change of Control Put Right***"), at any time following the Company's entry into a definitive agreement for a Change of Control Transaction until the twentieth (20th) Trading Day following the consummation of such Change in Control Transaction (the "***Change of Control Put Period***"). The Holder may exercise the Change of Control Put Right by delivering a written notice to the Company at any time during the Change of Control Put Period and the Change of the Control Prepayment Amount and the Exit Payment shall be due and payable in cash on the third (3rd) Trading Day following the Company's receipt of such notice.

Section 4. Registration of Transfers and Exchanges.

a) **Different Denominations**. This Debenture is exchangeable for an equal aggregate principal amount of Debentures of different authorized denominations, as requested by the Holder surrendering the same. No service charge will be payable for such registration of transfer or exchange.

b) **Investment Representations**. This Debenture has been issued subject to certain investment representations of the original Holder set forth in the Purchase

Agreement and may be transferred or exchanged only in compliance with the Purchase Agreement and applicable federal and state securities laws and regulations.

c) **Reliance on Debenture Register**. Prior to due presentment for transfer to the Company of this Debenture, the Company and any agent of the Company may treat the Person in whose name this Debenture is duly registered on the Debenture Register as the owner hereof for the purpose of receiving payment as herein provided and for all other purposes, whether or not this Debenture is overdue, and neither the Company nor any such agent shall be affected by notice to the contrary.

Section 5. Monthly Redemption; Delivery of Debenture Shares.

a) **Monthly Redemption**.

i. Commencing with the calendar month of March, 2024, the Holder shall have the right, at its option, to require the Company to redeem up to the Monthly Allowance (plus accrued and unpaid interest) per calendar month (the "***Holder Redemption Right***) in accordance with this ***Section 5(a)***. The Holder may exercise its Holder Redemption Right for a calendar month, at any time and from time to time, during such calendar month, by sending one or more written notices, the form of which is attached hereto as ***Annex A*** (each a "***Holder Redemption Notice***"), to the Company by not later than 11:59:59 P.M. (local time in New York, New York) on the last Trading Day of such calendar month, which Holder Redemption Notices shall specify the principal amount to be redeemed and the amount of accrued and unpaid interest thereon (together, the "***Holder Redemption Amount***"). The Company shall promptly, but in any event no more than two (2) Trading Days after the date that the Holder delivers a Holder Redemption Notice to the Company (the "***Holder Redemption Payment Date***") (1) if this Debenture is Stock Off, on the date that the Holder delivers the Holder Redemption Notice to the Company, pay to the Holder in cash by wire transfer of immediately available funds an amount equal to the Holder Redemption Amount specified in the Holder Redemption Notice or (2) if this Debenture is Stock On, on the date that the Company delivers the Holder Redemption Notice to the Company, deliver to the Holder shares of Common Stock as provided in this ***Section 5(a)***. For the avoidance of doubt, payment in cash or shares of Common Stock shall be determined according to the status of the Debenture as Stock On or Stock Off on the date that the Holder delivers the Holder Redemption Notice to the Company and not the Holder Redemption Payment Date. For the further avoidance of doubt, the Holder and the Company agree that the Holder may deliver more than one (1) Holder Redemption Notice during a calendar month provided that the sum of the Holder Redemption Amounts set forth in all of the Holder Redemption Notices delivered during such calendar month does not exceed the Monthly Allowance (plus accrued and unpaid interest). For the further avoidance of doubt, no reduction in the outstanding principal amount of this Debenture (as a result of redemption or otherwise) shall reduce or otherwise have any effect on the amount of the Monthly Allowance, which shall remain unchanged regardless of any such reduction in the outstanding principal amount of this Debenture, except that the Monthly Allowance shall not exceed the outstanding principal amount of this Debenture plus accrued and unpaid interest thereon.

ii. With respect to each calendar month during the term of this Debenture, the Company shall elect whether this Debenture shall be Stock On or Stock Off for such calendar month by delivering, on the fifth (5th) Trading Day prior to the first day of such calendar month, a written notice (a "***Stock On/Off Notice***") to the Holder of the Company's election to pay any Holder Redemption Amounts under ***Section 5(a)(i)*** in shares of Common Stock ("***Stock On***") or in cash ("***Stock Off***") during such calendar month. For the avoidance of doubt, the Company shall make the same election of Stock On or Stock Off with respect to all of the outstanding Debentures. If the Company fails to deliver the Stock On/Off Notice by the date required herein for any calendar month, the Company shall be deemed to have delivered a Stock On/Off Notice electing Stock Off for such calendar month. Once delivered (or deemed delivered) a Stock On/Off Notice shall be irrevocable as to the applicable calendar month and the Company may not change its election for such calendar month. If the Company elects Stock On in such Stock On/Off Notice, then the Company shall certify in such notice that the Equity Conditions are satisfied. In addition, to the extent that the Company elects Stock On, on the Trading Day prior to the first day of the applicable calendar month (such Trading Day, the "***Monthly Redemption Advance Date***"), the Company shall deliver to the Holder's or its broker's DTC account a number of freely tradable shares of Common Stock free from restrictive legends ("***Monthly Redemption Advance Shares***") equal to the quotient of (x) the Monthly Allowance and (y) the Stock Payment Price. For example, if the Stock Payment Price for the applicable Monthly Redemption Advance Date is $5.00 per share, then the Company shall deliver to the Holder a number of Monthly Redemption Advance Shares equal to 100,000 shares (e.g., $500,000/$5.00). For the avoidance of doubt and purposes of clarification, the Monthly Redemption Advance Shares are an advance on the Stock Payment Shares that the Holder anticipates receiving pursuant to ***Section 5(a)(iv)*** and shall not be deemed a payment of principal or interest hereunder except as provided in ***Section 5(a)(iv)***.

iii. If the Equity Conditions cease, for any reason, to be satisfied while this Debenture is Stock On (an "***Equity Conditions Failure***"), then, unless such Equity Conditions Failure is waived in writing by the Holder, this Debenture shall immediately be deemed to be Stock Off. The Company shall promptly, but in any event within one (1) Trading Day, notify the Holder of any Equity Conditions Failure and, unless such Equity Conditions Failure is waived in writing by the Holder, the Company shall not be permitted to make any Holder Redemption Payments during such calendar month in shares of Common Stock and all Holder Redemption Payments for the remainder of such calendar month shall be made in cash as provided herein.

iv. With respect to each Holder Redemption Notice delivered to the Company pursuant to ***Section 5(a)(i)*** at a time when this Debenture was Stock On, subject to the provisions of this ***Section 5(a)(iv)***, the Company shall, in payment of the Holder Redemption Amount deliver to the Holder a number of shares of Common Stock equal to the quotient of (x) the applicable Holder Redemption Amount and (y) the Stock Payment Price (such quotient of (x) and (y), the "***Stock Payment Shares***") by not later than the applicable Holder Redemption Payment Date; provided, that if the Holder has actually received Monthly Redemption Advance Shares, the number of Stock Payment Shares deliverable pursuant to the immediately preceding sentence shall be reduced (but not below

zero) by the *excess* (if any) of the Monthly Redemption Advance Shares actually received by the Holder *over* the aggregate number of Stock Payment Shares that were deliverable pursuant to this ***Section 5(a)(iv)*** for all other prior Holder Redemption Notices given during the same calendar month (such excess, as the Monthly Redemption Advance Shares may be further reduced pursuant to the last sentence of ***Section 5(d)***, the "***Available Advance Shares***"). For example, if, with respect to a particular calendar month, the Company delivered 100,000 Monthly Redemption Advance Shares on the Monthly Redemption Advance Date, the Holder submits a Holder Redemption Notice which would result in the issuance of 60,000 Stock Payment Shares, then the Monthly Redemption Advance Shares shall be deemed reduced by 60,000 shares, and the Available Advance Shares shall be 40,000 shares, and if subsequently during such calendar month, the Holder submits a Holder Redemption Notice that would require the issuance of 45,000 Stock Payment Shares, then the Monthly Redemption Advance Shares and the Available Advance Shares shall be deemed reduced to zero and the Company shall be required to deliver 5,000 shares to the Holder. The Holder's calculation of the Available Advance Shares set forth on the Holder Redemption Notice shall be binding on the Company absent manifest error.

v. Notwithstanding the foregoing or any other provision to the contrary contained herein, in the event that the number of Stock Payment Shares that the Company would be required to deliver in respect of any Holder Redemption Notice, when aggregated with the Stock Payment Shares issued in respect of each other Holder Redemption Notice delivered to the Company during the same calendar month, would exceed the Holder's Pro Rata Share of the Volume Limitation, then the Company shall pay the portion of the Holder Redemption Amount that would cause such number of Stock Payment Shares to exceed the Holder's Pro Rata Share of the Volume Limitation in cash. In addition, in the event that the aggregate number of Monthly Redemption Advance Shares or Stock Payment Shares to be delivered to the Holder pursuant to this ***Section 5(a)*** in would cause such Holder to exceed the Beneficial Ownership Limitation, then, (I) the Holder shall provide written notice to the Company that such delivery of all or a portion of such Monthly Redemption Advance Shares or Stock Payment Shares would cause the Holder to exceed the Beneficial Ownership Limitation, and (II) in addition to delivery of the number of Monthly Redemption Advance Shares or Stock Payment Shares that would not cause such Holder to exceed the Beneficial Ownership Limitation, as applicable, the Company shall issue to the Holder only such number of Monthly Redemption Advance Shares or Stock Payment Shares that would not cause the Holder to exceed the Beneficial Ownership Limitation, and with respect to Stock Payment Shares, pay to the Holder, in lieu of such number of Stock Payment Shares that would cause the Holder to exceed the Beneficial Ownership Limitation an amount in cash equal to the portion of the Holder Redemption Amount that would otherwise be payable in respect of such excess number of Stock Payment Shares.

vi. If there are any Available Advance Shares remaining after all Holder Redemption Notices delivered during a particular calendar month have been satisfied in full, the Holder will, at its option, retain such Available Advance Shares in partial satisfaction of the obligation of the Company to deliver Advance Shares in respect of the next month on which the Company elects for this Debenture to be Stock On or return such remaining number of Available Advance Shares to the Company.

b) **Delivery of Certificate for Stock Payment Shares**. The Company shall deliver to the Holder a certificate or certificates for the full number of Debenture Shares required to be delivered by the applicable Delivery Date; provided, however, that following the six (6) month anniversary of the Original Issue Date, the Company shall deliver any Debenture Shares required to be issued by the Company electronically through DTC without restrictive legends or trading restrictions of any kind not later than the applicable Delivery Date. The Company shall, at its own expense, cause Company Counsel to issue any legal opinions required to issue Debenture Shares without any restrictive legends or trading restrictions of any kind, such legal opinion to be substantially in the form of ***Annex B***. If Stock Payment Shares are not delivered to or as directed by the applicable Delivery Date, the Holder shall, in addition to, and not in limitation of, its other rights and remedies under this Debenture and the other Transaction Documents, be entitled to elect by written notice to the Company at any time on or before its receipt of such Stock Payment Shares, to rescind the applicable Holder Redemption Notice.

c) **Obligation Absolute; Partial Liquidated Damages**. Once the Company becomes obligated to issue any Debenture Shares in accordance with the terms of this Debenture, such obligation of the Company is absolute and unconditional, irrespective of any action or inaction by the Holder to enforce the same, any waiver or consent with respect to any provision hereof, the recovery of any judgment against any Person or any action to enforce the same, or any setoff, counterclaim, recoupment, limitation or termination, or any breach or alleged breach by the Holder or any other Person of any obligation to the Company or any violation or alleged violation of law by the Holder or any other Person, and irrespective of any other circumstance which might otherwise limit such obligation of the Company to the Holder in connection with the issuance of Debenture Shares. The Company may not refuse to issue any Debenture Shares required to be issued hereunder based on any claim that the Holder or anyone associated or Affiliated with the Holder has been engaged in any violation of law, agreement or for any other reason. If the Company fails for any reason to deliver to the Holder Debenture Shares required to be issued pursuant to any provision of this Debenture by the second (2nd) Trading Day following the applicable Delivery Date, the Company shall pay to the Holder, in cash, as partial liquidated damages and not as a penalty, for each $1,000 of principal amount being redeemed, $5 per Trading Day for each Trading Day after the second (2nd) Trading Day following such Delivery Date, as applicable, until such certificates are delivered or, in the case of a Holder Redemption Notice, the Holder rescinds such redemption; provided, however, if the Company has failed to deliver Debenture Shares required to be issued pursuant to any provision of this Debenture by the applicable Delivery Date more than twice in any twelve (12) month period, then such partial liquidated damages shall begin to accrue on the Delivery Date. Nothing herein shall limit a Holder's right to pursue actual damages or declare an Event of Default pursuant to ***Section 8*** hereof for the Company's failure to deliver Debenture Shares within the applicable period specified in this Debenture and the Holder shall have the right to pursue all remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief. The exercise of any such rights shall not prohibit the Holder from seeking to enforce damages pursuant to any other Section hereof or under applicable law. Without limiting the foregoing, the Company acknowledges that to the extent that the Company does not honor, or indicates to the Holder that it will not honor, its obligation to issue Stock Payment

Shares upon receipt of one or more Holder Redemption Notices while this Debenture is Stock On (a "***Repudiation***") the Holder's damages, in addition to out-of-pocket expenses and other damages, shall include Holder's entire lost profit resulting from its inability to receive Stock Payment Shares, which lost profit shall be calculated as the maximum number of Stock Payment Shares that the Holder would have been able to receive pursuant to ***Section 5*** at or following the time of such Repudiation multiplied by any reported trading price of the Common Stock from and after the time of the Repudiation selected by the Holder (whether or not the Holder has actually tendered Holder Redemption Notices for such maximum number of Stock Payment Shares).

d) **Compensation for Buy-In on Failure to Timely Deliver Certificates**. If the Company shall fail for any reason, or for no reason, on or prior to the applicable Delivery Date to credit the Holder's or its broker's DTC account, for such number of Debenture Shares to which the Holder is entitled under this Debenture (a "***Delivery Failure***") and if on or after such Delivery Date the Holder purchases (in an open market transaction or otherwise) shares of Common Stock to deliver in satisfaction of a sale by the Holder of shares of Common Stock issuable pursuant to this Debenture that the Holder anticipated receiving from the Company (a "***Buy-In***"), then, in addition to all other remedies available to the Holder, the Company shall, within three (3) Trading Days after the Holder's request and in the Holder's discretion, either (i) pay cash to the Holder in an amount equal to the Holder's total purchase price (including brokerage commissions and other out-of-pocket expenses, if any) for the shares of Common Stock so purchased (the "***Buy-In Price***"), at which point the Company's obligation to credit such Holder's or its broker's DTC account for such Debenture Shares shall terminate, or (ii) promptly honor its obligation to credit such Holder's or its broker's DTC account and pay cash to the Holder in an amount equal to the excess (if any) of the Buy-In Price over the product of (A) such number of Debenture Shares, times (B) any trading price of the shares of Common Stock selected by the Holder in writing as in effect at any time during the period beginning on the Monthly Redemption Advance Date, the date of the Holder Redemption Notice, Interest Shares Advance Date or Interest Payment Date, as applicable, and ending on the applicable Delivery Date. Nothing shall limit the Holder's right to pursue any other remedies available to it hereunder, at law or in equity, including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver Debenture Shares pursuant to the terms hereof.

e) **Fractional Shares**. No fractional shares or scrip representing fractional shares shall be issued under this Debenture. As to any fraction of a share which the Holder would otherwise be entitled, the Company shall round up to the next whole share.

f) **Transfer Taxes and Expenses**. The issuance of Debenture Shares shall be made without charge to the Holder hereof for any documentary stamp or similar taxes that may be payable in respect of the issue or delivery of such Debenture Shares. The Company shall pay all Transfer Agent fees required for processing of any issuance of Debenture Shares and all fees to DTC (or another established clearing corporation performing similar functions) required for same-day electronic delivery of Debenture Shares.

g) **Beneficial Ownership Limitation**. Notwithstanding anything to the contrary set forth in this Debenture, at no time may the Company issue to the Holder Debenture Shares to the extent that after giving effect to such issuance, the Holder (together with the Holder's Affiliates, and any Persons acting as a group together with the Holder or any of the Holder's Affiliates) would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of this ***Section 5(g)***, beneficial ownership shall be calculated in accordance with *Section 13(d)* of the Exchange Act and the rules and regulations promulgated thereunder. To the extent that the limitation contained in this ***Section 5(g)*** applies, the determination of whether shares of Common Stock may be issued pursuant to this Debenture (in relation to other securities owned by the Holder together with any Affiliates) shall be in the sole discretion of the Holder, and the submission of a Holder Redemption Notice (at a time when this Debenture is Stock On) shall be deemed to be the Holder's determination of whether shares of Common Stock may be issued pursuant to this Debenture (in relation to other securities owned by the Holder together with any Affiliates) subject to the Beneficial Ownership Limitation. In addition, the Holder may notify the Company that the issuance of any Debenture Shares would cause the Holder to exceed the Beneficial Ownership Limitation, in which case, the Company shall only issue to the Holder such number of shares of Common Stock that would not cause the Holder to exceed the Beneficial Ownership (as determined by the Holder in accordance with this ***Section 5(g)***). To ensure compliance with this restriction, the Holder will be deemed to represent to the Company each time it delivers a Holder Redemption Notice (at a time that this Debenture is Stock On) that such Holder Redemption Notice has not violated the restrictions set forth in this paragraph and the Company shall have no obligation to verify or confirm the accuracy of such determination. In addition, a determination as to any group status as contemplated above shall be determined in accordance with *Section 13(d)* of the Exchange Act and the rules and regulations promulgated thereunder. For purposes of this ***Section 5(g)***, in determining the number of outstanding shares of Common Stock, the Holder may rely on the number of outstanding shares of Common Stock as stated in the most recent of the following: (i) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (ii) a more recent public announcement by the Company, or (iii) a more recent written notice by the Company or the Company's transfer agent setting forth the number of shares of Common Stock outstanding. Upon the written or oral request of a Holder, the Company shall within two (2) Trading Days confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the issuance of shares of Common Stock under this Debenture or the Warrants to the Holder or its Affiliates since the date as of which such number of outstanding shares of Common Stock was reported. The "***Beneficial Ownership Limitation***" shall be 4.9% of the number of shares of the Common Stock outstanding immediately after giving effect to the applicable issuance of shares of Common Stock pursuant to this Debenture held by the Holder. The Holder, upon not less than sixty-one (61) days' prior notice to the Borrowers, may increase or decrease the Beneficial Ownership Limitation provisions of this ***Section 5(g)***, provided that the Beneficial Ownership Limitation in no event exceeds 9.9% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock pursuant to the terms of this Debenture and the Beneficial Ownership

Limitation provisions of this ***Section 5(g)***shall continue to apply. Any such increase or decrease will not be effective until the sixty first (61st) day after such notice is delivered to the Company. The Beneficial Ownership Limitation provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this ***Section 5(g)*** to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation contained herein or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Debenture.

h) **Principal Market Regulation**. The Company shall not issue any Debenture Shares if the issuance thereof would exceed the aggregate number of shares of Common Stock which the Company may issue pursuant to the terms of this Debenture without breaching the Company's obligations under the rules or regulations of the Principal Market (the number of shares which may be issued without violating such rules and regulations, including rules related to the aggregation of offerings under NASDAQ Listing *Rule 5635(d)*, the "***Exchange Cap***"), except that such limitation shall no longer apply to the extent that the Company (A) obtains the approval of its stockholders for such issuance or issuances or (B) obtains a written opinion from Company Counsel that such approval is not required, which opinion shall be reasonably satisfactory to the Holder. Until such approval or such written opinion is obtained, no Purchaser shall be issued Debenture Shares in an amount greater than the product of (i) the Exchange Cap multiplied by (ii) the quotient of (A) the aggregate original principal amount of Debentures issued to such Purchaser pursuant to the Securities Purchase Agreement on the Original Issue Date divided by (B) the aggregate original principal amount of all Debentures issued to the Purchasers pursuant to the Securities Purchase Agreement on the Original Issue Date (with respect to each Purchaser, the "***Exchange Cap Allocation***"). On the Original Issue Date, the Holder's Exchange Cap Allocation with respect to this Debenture issued to such Holder is _____ shares of Common Stock. In the event that any Purchaser shall sell or otherwise transfer any of such Purchaser's Debentures, the transferee shall be allocated a pro rata portion of such Purchaser's Exchange Cap Allocation with respect to such portion of such Debentures so transferred, and the restrictions of the prior sentence shall apply to such transferee with respect to the portion of the Exchange Cap Allocation so allocated to such transferee. Upon the satisfaction in full of a Purchaser's Debentures, the difference (if any) between such holder's Exchange Cap Allocation and the number of Debenture Shares actually issued to such holder pursuant to such holder's Debentures shall be allocated to the respective Exchange Cap Allocations of the remaining holders of Debentures on a pro rata basis in proportion to the relative outstanding principal amounts of the Debentures then held by each such holder.

Section 6. Fundamental Transaction. If, at any time while this Debenture is outstanding, the Company effects a Fundamental Transaction, then the Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "***Successor Entity***") to assume in writing all of the obligations of the Company under this Debenture and the other Transaction Documents (as defined in the Purchase Agreement) in accordance with the provisions of this ***Section 6*** pursuant to written agreements in form and substance reasonably satisfactory to the Holder and

approved by the Holder (without unreasonable delay) prior to such Fundamental Transaction and shall, at the option of the holder of this Debenture, deliver to the Holder in exchange for this Debenture a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Debenture, and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for (so that from and after the date of such Fundamental Transaction, the provisions of this Debenture and the other Transaction Documents referring to the "Company" shall refer instead to the Successor Entity), and may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Debenture and the other Transaction Documents with the same effect as if such Successor Entity had been named as the Company herein. For the avoidance of doubt, nothing in this Section 6 shall be deemed implied consent to any Fundamental Transaction otherwise prohibited by the Transaction Documents.

Section 7. Covenants.

a) **Negative Covenants**. As long as any portion of this Debenture remains outstanding, and unless the Holder shall have otherwise given prior written consent, the Company shall not, and shall not permit any of the Subsidiaries to, directly or indirectly:

i. other than Permitted Indebtedness, enter into, issue, create, incur, assume, guarantee or suffer to exist any Indebtedness of any kind, including, but not limited to, a guarantee, on or with respect to any of its property or assets now owned or hereafter acquired or any interest therein or any income or profits therefrom;

ii. other than Permitted Liens, enter into, create, incur, assume or suffer to exist any Liens of any kind, on or with respect to any of its property or assets now owned or hereafter acquired or any interest therein or any income or profits therefrom;

iii. make or hold any Investments other than Permitted Investments;

iv. dispose of any of its assets, including, without limitation, any Disposition to a Subsidiary that is not a Qualified Subsidiary other than (x) Permitted Dispositions and (y) the Disposition of Needle Rock Ranch provided that such Disposition results in gross proceeds to the Company of at least $1,800,000 and the Company prepays this Debenture in an amount equal to 100% of such gross proceeds (less the Company's reasonable and documented out-of-pocket transactions costs incurred in connection therewith) from such Disposition pursuant to Section 3(a) simultaneously with the consummation thereof;

v. issue Disqualified Stock;

vi. amend its charter documents, including, without limitation, its certificate of incorporation and bylaws, in any manner that adversely affects any rights of the Holder under the Transaction Documents in any material respect;

vii. merge, dissolve, liquidate, consolidate with or into another Person; provided, that (i) the Company may merge or consolidate with any of its Subsidiaries so long as the Company is the surviving Person of such merger or consolidation, (ii) any Subsidiary of the Company may merge or consolidate with any other Subsidiary of the Company (provided, that, if any Subsidiary party to such merger or consolidation is a Qualified Subsidiary, the surviving Person of such merger or consolidation must be a Qualified Subsidiary), (iii) any Subsidiary of the Company may liquidate or dissolve so long as the assets of such Subsidiary are distributed to the Company or a Qualified Subsidiary in connection with such liquidation or dissolution, and (iv) the Company or any of its Subsidiaries may consummate a merger or consolidation in connection with any Permitted Investment, so long as, in the case of this clause (iv), (A) if the Company is a party to such merger or consolidation, the Company is the surviving entity thereof, or (B) if any Qualified Subsidiary is a party to such merger or consolidation, a Qualified Subsidiary is the surviving entity thereof;

viii. repay, repurchase or offer to repay, repurchase or otherwise acquire any of its Equity Interests; provided, that, the Company may purchase or redeem from any officer, employee, director or consultant of, the Company or any of its Subsidiaries upon the death, termination, disability, resignation or other voluntary or involuntary cessation of such person's employment or directorship or other applicable arrangement, or otherwise in accordance with any stock option or stock appreciation rights plan or any stock ownership or subscription plan or equity incentive or other similar plan or any employment, consultancy or employment or consultancy termination agreement, shares of the Company's Equity Interests or options or warrants to acquire such Equity Interests in an aggregate amount for all such payments not to exceed $1,000,000 in any calendar year;

ix. repay, repurchase or offer to repay, repurchase or otherwise acquire any Indebtedness other than (i) the Debentures and (ii) regularly scheduled principal and interest payments under the terms of any Permitted Indebtedness, provided that any such payments of Permitted Indebtedness shall not be permitted if, at such time, or after giving effect to such payment, either (A) any Event of Default under ***Section 8(a)(i)*** or ***8(a)(ii)*** exists or occurs and is continuing, or (B) any other Event of Default shall exist and the Debentures shall have been accelerated pursuant to ***Section 8(b)***;

x. pay dividends or distributions on any of its Equity Securities, except that any Subsidiary may, directly or indirectly, pay any dividend or distribution to the Company or any Qualified Subsidiary;

xi. create any new Foreign Subsidiary unless the Investment by the Company or its Subsidiary in such Foreign Subsidiary is a Permitted Investment;

xii. create any new Domestic Subsidiary unless such Subsidiary promptly executes a joinder to the Subsidiary Guaranty and Security Agreement;

xiii. enter into any transaction with any Affiliate of the Company which would be required to be disclosed in any public filing with the Commission, unless such transaction is made on an arm's-length basis; or

xiv. enter into any agreement with respect to any of the foregoing.

b) **Affirmative Covenants**. As long as any portion of this Debenture remains outstanding, the Company shall, and shall cause each of its Subsidiaries to:

i. preserve and maintain its legal existence in the jurisdiction of its organization (except as a result of a transaction permitted by ***Section 7(a)(vii)***), and qualify and remain qualified as a foreign business entity in each jurisdiction in which qualification is necessary in view of its business and operations or the ownership of its properties and where failure maintain or qualify could reasonably be expected to have a Material Adverse Effect;

ii. provide to Agent and the Holder, promptly upon becoming aware thereof (and in any event within two (2) days after the occurrence thereof), a notice of each Event of Default known to an executive officer of the Company, together with a statement of such executive officer setting forth the details of such Event of Default and the actions which the Company has taken and proposes to take with respect thereto;

iii. except as otherwise would not reasonably be expected to result in a Material Adverse Effect, (a) pay and discharge as the same shall become due and payable: (i) all tax liabilities, assessments and governmental charges or levies upon it or its properties or assets, unless the same are being contested in good faith by appropriate proceedings diligently conducted (which proceedings have the effect of preventing the forfeiture or sale of the property or assets subject to any such Lien) and adequate reserves in accordance with GAAP are being maintained by the Company or such Subsidiary; (ii) all lawful claims which, if unpaid, would by law become a Lien upon its property, unless the same are being contested in good faith by appropriate proceedings diligently conducted (which proceedings have the effect of preventing the forfeiture or sale of the property or assets subject to any such Lien) and adequate reserves in accordance with GAAP are being maintained by the Company or such Subsidiary; and (iii) all Indebtedness, as and when due and payable, but subject to the terms of this Debenture; and (b) timely file all tax returns required to be filed (subject to any valid extension);

iv. (a) maintain, preserve and protect all of its properties and equipment necessary in the operation of its business in good working order and condition, ordinary wear and tear excepted; and (b) make all necessary repairs thereto and renewals and replacements thereof except, in the case of either clause (a) or (b), where the failure to do so could not reasonably be expected to have a Material Adverse Effect;

v. comply in all material respects with the requirements of all applicable laws and all orders, writs, injunctions and decrees applicable to it or to its business or property;

vi. maintain (a) insurance with financially sound and reputable insurance companies in at least the amounts (and with only those deductibles) customarily maintained, and against such risks as are typically insured against, by Persons of comparable size engaged in the same or similar business as the Company and its

Subsidiaries; and (b) all worker's compensation, employer's liability insurance or similar insurance as may be required under the laws of any state or jurisdiction in which it may be engaged in business. All such insurance policies required pursuant to clause (a) of this Section shall name the Agent as a loss payee (in the case of property or other casualty insurance) and an additional insured (in the case of liability insurance);

vii. maintain, preserve and enforce all of its material rights and remedies under the Pledged Indebtedness and refrain from (x) altering, modifying or amending any of the terms and conditions of the Pledged Indebtedness (including, without limitation, reducing or otherwise forgiving all or any portion of the principal amount thereof), (y) subordinating the payment of all or any part of the Pledged Indebtedness or Liens securing the Pledged Indebtedness or (z) releasing any Liens securing the Pledged Indebtedness; and

viii. use reasonable efforts to cause the Company to remain eligible to use Form S-3 for a delayed or continuous offering pursuant to *Rule 415(a)(1)(x)* promulgated under the Securities Act of 1933, as amended.

c) Blocked Account. The Company shall, at all times while this Debenture remains outstanding, maintain on deposit in a segregated account of the Company at Truist Bank (the "***Blocked Account***") an amount of unencumbered cash equal to $7,500,000. Such account shall be subject to an Account Control Agreement which shall provide that the Company shall have no access to such account and otherwise reasonably acceptable to the Holder (the "***Blocked Account Agreement***").

d) **Revenue**. With respect to each fiscal quarter of the Company, the Company's revenue (as determined in accordance with GAAP) for each such fiscal quarter shall not be less than the "***Revenue Target***" for such fiscal quarter set forth on ***Schedule E***.

e) **Compliance Certificate**. The Company shall, within one Trading Day of the Company's filing of each Quarterly Report on Form 10-Q and each Annual Report on Form 10-K with the Commission (but in any event not later than forty-five (45) days after the last day of each calendar quarter, except in the case of the calendar quarter ended December 31, ninety (90) days thereafter), deliver to the Holder a compliance certificate executed by the Company's chief executive officer or chief financial officer containing a calculation of each financial covenant set forth in this ***Section 7*** (with reasonable supporting detail and calculations), stating that no Events of Default have occurred since the date of the last compliance certificate (or, in the case of the initial compliance certificate, the Original Issue Date) and certifying that no new Subsidiaries have been formed or acquired since the date of the prior compliance certificate (or, in the case of the initial compliance certificate, the Original Issue Date); provided, that notwithstanding the foregoing, without the prior written consent of the Holder, such compliance certificate shall not contain any material, non-public information and shall be derived from the information publicly available in the Company's reports filed with the Commission or otherwise publicly available.

Section 8. Events of Default.

a) "***Event of Default***" means, wherever used herein, any of the following events (whatever the reason for such event and whether such event shall be voluntary or involuntary or effected by operation of law or pursuant to any judgment, decree or order of any court, or any order, rule or regulation of any administrative body or Governmental Authority):

i. any default in the payment of the principal amount of any Debenture, whether on a Prepayment Date, Holder Redemption Payment Date or the Maturity Date or by acceleration or otherwise;

ii. any default in the payment of interest, liquidated damages and/or other amounts owing to a Holder on any Debenture, as and when the same shall become due and payable, in each case, which such default continues for three (3) Trading Days;

iii. the Company shall fail to observe or perform any other covenant or agreement contained in this Debenture (other than a breach by the Company of its obligations to deliver Debenture Shares to the Holder pursuant to the terms of this Debenture which breach is addressed in clause (ix) below) which failure is not cured, if possible to cure, within the earlier to occur of (A) fifteen (15) days after notice of such failure sent by the Holder to the Company and (B) fifteen (15) days after the Company has become aware or should have become aware of such failure; provided, that any failure to observe or perform any provision of ***Sections 7(a), (c), (d) and (e)*** shall be an immediate Event of Default hereunder without any grace period;

iv. a default or event of default (subject to any grace or cure period provided in the applicable agreement, document or instrument) or any breach shall occur under any of the Transaction Documents, which failure is not cured, if possible to cure, within fifteen (15) days following notice of failure sent by the Holder to the Company;

v. any representation or warranty made in the Securities Purchase Agreement or any other Transaction Documents, any written statement pursuant hereto or thereto or any other report, financial statement or certificate made or delivered to the Holder or any other Holder pursuant to the Transaction Documents shall be untrue or incorrect in any material respect as of the date when made or deemed made;

vi. the Company or any Subsidiary shall be subject to a Bankruptcy Event;

vii. the Company or any Subsidiary shall default on any of its obligations under any mortgage, credit agreement or other facility, indenture agreement, factoring agreement or other instrument under which there may be issued, or by which there may be secured or evidenced, any Indebtedness for borrowed money or money due under any long term leasing or factoring arrangement beyond any grace period provided with respect thereto that (a) involves an obligation greater than $500,000, whether such Indebtedness now exists or shall hereafter be created, and (b) results in such Indebtedness

becoming or being declared due and payable prior to the date on which it would otherwise become due and payable;

viii. (a) the Common Stock shall not be eligible for listing or quotation for trading on a Trading Market and shall not be eligible to resume listing or quotation for trading thereon within five (5) Trading Days, (b) the shares of Common Stock are suspended from trading or otherwise not listed or quoted for trading on a Trading Market for ten (10) Trading Days or more (which need not be consecutive) during any twelve (12) month period, or (c) the shares of Common Stock are suspended from trading or otherwise not listed or quoted for trading on a Trading Market for three (3) consecutive Trading Days or more; provided, however, that for purposes of this subparagraph (viii), any day on which there is a general suspension of trading on the Principal Market shall be disregarded;

ix. the Company shall fail for any reason to deliver any Debenture Shares to a Holder on the applicable Delivery Date therefor;

x. the Company fails to issue any certificate or any shares of Common Stock under the Debenture free of restrictive legends when and as required by this Debenture or the Securities Purchase Agreement, unless otherwise then prohibited by applicable securities laws, and any such failure remains uncured for two (2) Trading Days;

xi. the Company or any Guarantor shall breach in any material respect any agreement delivered to the initial Holder pursuant to Section 2.2 of the Purchase Agreement and such breach is not cured within fifteen (15) days of such breach;

xii. [Reserved];

xiii. a judgment in excess of $500,000 (to the extent not covered by insurance) is entered against the Company and, within sixty (60) days after entry thereof, such judgment is not discharged or satisfied or execution thereof stayed pending appeal, or within sixty (60) days after the expiration of any such stay, such judgment is not discharged or satisfied;

xiv. (A) Truist Bank fails to comply with its obligations under the Blocked Account Agreement, (B) without limiting clause (A), Truist Bank notifies the Agent of its intention not to comply with the terms of the Blocked Account Agreement, or (C) the Company fails to comply, or notifies the Agent of its intention to not comply, with its obligations under the Blocked Account Agreement; provided, however, with respect to clauses (A) and (B), it shall not be an Event of Default hereunder if possession of the funds held in the Blocked Account are transferred to the Agent;

xv. (A) the Company or Truist Bank closes the Blocked Account or terminates the Blocked Account Agreement, or (B) without limiting clause (A), the Company or Truist Bank notifies the Agent of its intention to close the Blocked Account or terminate the Blocked Account Agreement; provided, however, it shall not be an Event of Default hereunder if possession of the funds held in the Blocked Account are transferred to the Agent;

xvi. any Security Document shall for any reason fail or cease to create a separate valid and, except to the extent permitted by the terms hereof or thereof, perfected first priority (subject to Permitted Liens) Lien Collateral (as defined in the applicable Security Documents) in favor of the Collateral Agent (as defined in the Securities Purchase Agreement) or any material provision of any Security Document shall at any time for any reason cease to be valid and binding on or enforceable against the Company or the validity or enforceability thereof shall be contested by any party thereto, or a proceeding shall be commenced by the Company or any governmental authority having jurisdiction over the Company, seeking to establish the invalidity or unenforceability thereof;

xvii. [Reserved];

xviii. any Material Adverse Effect occurs if, in the reasonable good faith judgment of the Agent, such Material Adverse Effect would reasonably be likely to result in an Event of Default under ***Section 8(a)(i)*** or ***8(a)(ii)*** within one year following the occurrence of such Material Adverse Effect; or

xix. the occurrence of any Public Information Failure that remains uncured for at least ten (10) calendar days or any restatement of any the financial statements included in any Annual Report on Form 10-K or Quarterly Report on Form 10-Q of the Company.

b) **Remedies Upon Event of Default**. If any Event of Default occurs and is continuing, the outstanding principal amount of this Debenture, the Prepayment Premium, the Exit Payment, plus accrued but unpaid interest, liquidated damages and other amounts owing in respect thereof through the date of acceleration, shall become, at the Holder's election, immediately due and payable in cash; provided, that such acceleration shall be automatic, without any notice or other action of the Holder required, in respect of an Event of Default occurring pursuant to ***clause (vi)*** of ***Section 8(a)***. In connection with such acceleration described herein, the Holder need not provide, and the Company hereby waives, any presentment, demand, protest or other notice of any kind, and the Holder may immediately and without expiration of any grace period enforce any and all of its rights and remedies hereunder and all other remedies available to it under applicable law. Such acceleration may be rescinded and annulled by Holder at any time prior to payment in full hereunder and the Holder shall have all rights as a holder of the Debenture until such time, if any, as the Holder receives full payment pursuant to this ***Section 8(b).*** No such rescission or annulment shall affect any subsequent Event of Default or impair any right consequent thereon.

Section 9. Miscellaneous.

a) **Notices**. Any and all notices or other communications or deliveries to be provided by the Holder hereunder, including, without limitation, any Holder Redemption Notice, shall be in writing and delivered personally, by email, or sent by a nationally recognized overnight courier service, addressed to the Company, at the address set forth above, or such email address, or address as the Company may specify for such purposes by notice to the Holder delivered in accordance with this ***Section 9(a)***. Any and all notices

or other communications or deliveries to be provided by the Company hereunder shall be in writing and delivered personally, by email, or sent by a nationally recognized overnight courier service addressed to the Holder at the email address or address of the Holder appearing on the books of the Company, or if no such facsimile number or email or address appears on the books of the Company, at the principal place of business of such Holder, as set forth in the Purchase Agreement. Any notice or other communication or deliveries hereunder shall be deemed given and effective on the earliest of (i) the date of transmission, if such notice or communication is delivered via email to the email address set forth on the signature pages attached hereto prior to 5:30 p.m. (local time in New York City, New York) (or such later time expressly specified elsewhere in this Debenture) on any date, (ii) the next Trading Day after the date of transmission, if such notice or communication is delivered via email attachment to the email address set forth on the signature pages attached hereto on a day that is not a Trading Day or later than 5:30 p.m. (local time in New York City, New York) (or such later time expressly specified elsewhere in this Debenture) on any Trading Day, or (iii) the second (2nd) Trading Day following the date of mailing, if sent by U.S. nationally recognized overnight courier service.

b) **Absolute Obligation**. Except as expressly provided herein, no provision of this Debenture shall alter or impair the obligation of the Company, which is absolute and unconditional, to pay the principal of, liquidated damages and accrued interest, as applicable, on this Debenture at the time, place, and rate, and in the coin or currency, herein prescribed. This Debenture is a direct debt obligation of the Company.

c) **Lost or Mutilated Debenture**. If this Debenture shall be mutilated, lost, stolen or destroyed, the Company shall execute and deliver, in exchange and substitution for and upon cancellation of a mutilated Debenture, or in lieu of or in substitution for a lost, stolen or destroyed Debenture, a new Debenture for the principal amount of this Debenture so mutilated, lost, stolen or destroyed, but only upon receipt of evidence of such loss, theft or destruction of such Debenture, and of the ownership hereof, reasonably satisfactory to the Company.

d) **Governing Law**. All questions concerning the construction, validity, enforcement and interpretation of this Debenture shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflict of laws thereof. Each party agrees that all legal proceedings concerning the interpretation, enforcement and defense of the transactions contemplated by any of the Transaction Documents (whether brought against a party hereto or its respective Affiliates, directors, officers, shareholders, employees or agents) shall be commenced in the state and federal courts sitting in the City of New York, Borough of Manhattan (the "***New York Courts***"). Each party hereto hereby irrevocably submits to the exclusive jurisdiction of the New York Courts for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein (including with respect to the enforcement of any of the Transaction Documents), and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of such New York Courts, or such New York Courts are improper or inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served

in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Debenture and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by applicable law. Each party hereto hereby irrevocably waives, to the fullest extent permitted by applicable law, any and all right to trial by jury in any legal proceeding arising out of or relating to this Debenture or the transactions contemplated hereby.

e) **Amendments; Waivers**. Any waiver by the Company or the Holder of a breach of any provision of this Debenture shall not operate as or be construed to be a waiver of any other breach of such provision or of any breach of any other provision of this Debenture. The failure of the Company or the Holder to insist upon strict adherence to any term of this Debenture on one or more occasions shall not be considered a waiver or deprive that party of the right thereafter to insist upon strict adherence to that term or any other term of this Debenture on any other occasion. Any waiver by the Company or the Holder must be in writing. Any obligation of the Company pursuant to this Debenture may be waived by the Holders of at least 50.1% of the outstanding principal amount of Debentures, which waiver shall be binding on all of the Holders of the Debentures and their successors and assigns. Any provision of this Debenture may be amended by a written instrument executed by the Company and the Holders of at least 50.1% of the outstanding principal amount of Debentures, which amendment shall be binding on all of the Holders of the Debentures and their successors and assigns.

f) **Severability**. If any provision of this Debenture is invalid, illegal or unenforceable, the balance of this Debenture shall remain in effect, and if any provision is inapplicable to any Person or circumstance, it shall nevertheless remain applicable to all other Persons and circumstances. If it shall be found that any interest or other amount deemed interest due hereunder violates the applicable law governing usury, the applicable rate of interest due hereunder shall automatically be lowered to equal the maximum rate of interest permitted under applicable law. The Company covenants (to the extent that it may lawfully do so) that it shall not at any time insist upon, plead, or in any manner whatsoever claim or take the benefit or advantage of, any stay, extension or usury law or other law which would prohibit or forgive the Company from paying all or any portion of the principal of or interest on this Debenture as contemplated herein, wherever enacted, now or at any time hereafter in force, or which may affect the covenants or the performance of this Debenture, and the Company (to the extent it may lawfully do so) hereby expressly waives all benefits or advantage of any such law, and covenants that it will not, by resort to any such law, hinder, delay or impede the execution of any power herein granted to the Holder, but will suffer and permit the execution of every such as though no such law has been enacted.

g) **Remedies, Characterizations, Other Obligations, Breaches and Injunctive Relief**. The remedies provided in this Debenture shall be cumulative and in addition to all other remedies available under this Debenture and any of the other Transaction Documents at law or in equity (including a decree of specific performance and/or other injunctive relief), and nothing herein shall limit the Holder's right to pursue

actual and consequential damages for any failure by the Company to comply with the terms of this Debenture. The Company covenants to the Holder that there shall be no characterization concerning this instrument other than as expressly provided herein. Amounts set forth or provided for herein with respect to payments and the like (and the computation thereof) shall be the amounts to be received by the Holder and shall not, except as expressly provided herein, be subject to any other obligation of the Company (or the performance thereof). The Company acknowledges that a breach by it of its obligations hereunder will cause irreparable harm to the Holder and that the remedy at law for any such breach may be inadequate. The Company therefore agrees that, in the event of any such breach or threatened breach, the Holder shall be entitled, in addition to all other available remedies, to an injunction restraining any such breach or any such threatened breach, without the necessity of showing economic loss and without any bond or other security being required. The Company shall provide all information and documentation to the Holder that is reasonably requested by the Holder to enable the Holder to confirm the Company's compliance with the terms and conditions of this Debenture.

h) **Next Business Day**. Whenever any payment or other obligation hereunder shall be due on a day other than a Business Day, such payment shall be made on the next succeeding Business Day.

i) **Headings**. The headings contained herein are for convenience only, do not constitute a part of this Debenture and shall not be deemed to limit or affect any of the provisions hereof.

j) **Secured Obligation**. The obligations of the Company under this Debenture are secured by the Collateral pledged by the Company pursuant to the Security Agreement, dated as of the date hereof, between the Company and the Agent. For the avoidance of doubt, and notwithstanding anything contained herein to the contrary, subject to Permitted Liens, the Holder shall have the first lien over all Collateral, which will rank higher than any other creditor of the Company or its Subsidiaries, to the extent permitted by law.

k) **Limitation of Liability**. Neither Holder, Agent nor any Affiliate, officer, director, employee, attorney, or agent of Holder or Agent shall have any liability with respect to, and the Company hereby waives, releases, and agrees not to sue any of them upon, any claim for any special, indirect, incidental, or consequential damages suffered or incurred by the Company in connection with, arising out of, or in any way related to, this Debenture or any of the other Transaction Documents, or any of the transactions contemplated by this Agreement or any of the other Transaction Documents.

l) **Payments Free of Taxes**. Any and all payments by or on account of any obligation of the Company under this Debenture and any other Transaction Documents shall be made without deduction or withholding for any taxes, except as required by applicable law. If any applicable law (as determined in the good faith discretion of the Company) requires the deduction or withholding of any tax from any such payment by the Company, then the Company shall be entitled to make such deduction or withholding and shall timely pay the full amount deducted or withheld to the relevant Governmental Authority in accordance with applicable law and then the sum payable by the Company to

the Holder shall be increased as necessary so that after such deduction or withholding has been made (including such deductions and withholdings applicable to additional sums payable under this ***Section 9(l)***) the Holder receives an amount equal to the sum it would have received had no such deduction or withholding been made.

m) **Costs of Enforcement**. The Company hereby covenants and agrees to indemnify, defend and hold the Holder harmless from and against all costs and expenses, including reasonable attorneys' fees and their reasonable costs, together with interest thereon at the Applicable Rate, incurred by the Holder in enforcing its rights under this Debenture; or if the Holder is made a party as a defendant in any action or proceeding arising out of or in connection with its status as a lender, or if the Holder is requested to respond to any subpoena or other legal process issued in connection with this Debenture; or reasonable disbursements arising out of any costs and expenses, including reasonable attorneys' fees and their costs incurred in any bankruptcy case; or for any legal or appraisal reviews, advice or counsel performed for the Holder following a request by the Company for waiver, modification or amendment of this Debenture.

****

(Signature Pages Follow)

IN WITNESS WHEREOF, the parties below have caused this Debenture to be duly executed by a duly authorized officer as of the date first above indicated.

22ND CENTURY GROUP, INC.

By: /s/ Peter Ferola
Name: Peter Ferola
Title: General Counsel & Corporate Secretary
Facsimile No. for delivery of Notices:
E-mail Address for delivery of Notices:

ANNEX A

HOLDER REDEMPTION NOTICE

The undersigned hereby exercises its right to require the Company to redeem the 7% Original Issue Discount Senior Secured Debenture due March 3, 2026 (the "***Debenture***") of 22nd Century Group, Inc, a Nevada corporation (the "***Company***"), in accordance with *Section 5(a)* of the Debenture.

Holder Redemption Right calculations:

Holder Redemption Amount: $ _____ principal

Additional accrued and unpaid interest pursuant to *Section 2.1(d)* of the Debenture, if applicable: $_____

Stock Payment Price, if applicable: _____ shares

Available Advance Shares, if applicable: _____ shares

Stock Payment Shares to be delivered on Holder Redemption Payment Date, if applicable (positive difference of Stock Payment Shares and Available Advance Shares): _____

Holder's Pro Rata Share of Volume Limitation: $_____

Cash payable pursuant to *Section 5(a)(v)* of the Debenture, if applicable: $_____

Outstanding principal payment after giving effect to this Holder Redemption Notice: $_____

Remaining Monthly Allowance after giving effect to this Holder Redemption Notice: $_____

Signature:

Name:

Wire Instructions:

Or, if applicable

Address for Delivery of Common Stock Certificates:

Or

DWAC Instructions:

Broker No:_____

Account No:_____

ANNEX B

FORM OF RULE 144 OPINION

We have been informed that _____ (the "***Stockholder***") plans to sell some or all of the [____] shares (the "***Shares***") of the Company's common stock, par value $0.00001 per share (the "***Common Stock***") to be issued to the Stockholder on the date hereof pursuant to the Company's instruction letter of even date herewith relating the issuance of the Shares. We understand that the Shares are being issued in satisfaction of certain obligations of the Company pursuant to an outstanding 7% Original Issue Discount Senior Secured Debenture issued by the Company to the Stockholder on March 3, 2023 (the "***Debenture***").

We have been informed, and have not independently verified, that: (i) the Stockholder is not an affiliate of the Company at the present time and has not been an affiliate during the preceding three (3) months; and (ii) the Shares were acquired by the Stockholder directly from the Company pursuant to the terms of the Debenture, no additional consideration was paid by the Stockholder in connection with such issuance of the Shares pursuant to the terms of the Debenture, and a period of at least six (6) months has elapsed since the full purchase price or other consideration for the Debenture was paid or given by the Stockholder to the Company. For purposes of this opinion we have relied upon the statement set forth on the cover page of the Company's [Quarterly][Annual] Report on Form 10-[Q][K] for the fiscal [quarter][year] ended [_____], 20__ to the effect that the Company has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding twelve (12) months (or for such shorter period that the Company was required to file such reports) and has been subject to such filing requirements for the past ninety (90) days. We have also been informed by the Company, and have relied upon such representations, that it is not currently, nor has it ever been, a shell company or issuer of the type described in *Rule 144(i)(1)(i)*.

In rendering this opinion letter, we have assumed the genuineness of all signatures, the legal capacity of natural persons, the authenticity of all documents submitted to us as originals, the conformity to originals (and authenticity of such originals) of all documents submitted to us as copies, and the continuing accuracy of all information contained in all such documents.

Based on, and subject to, the foregoing, without having made any independent verification thereof, and assuming the sale of the Shares occurs prior to [<<DUE DATE OF NEXT PERIODIC REPORT>>], you may issue certificates evidencing the Shares free of any restrictive securities legend or stop transfer orders related thereto.

Schedule E

Revenue

Calendar Quarter	**Revenue Target**
March 31, 2023	**$16,500,000**
June 30, 2023	**$18,000,000**
September 30, 2023	**$18,500,000**
December 31, 2023	**$20,500,000**
March 31, 2024	**$25,100,000**
June 30, 2024	**$27,550,000**
September 30, 2024	**$29,600,000**
December 31, 2024	**$33,100,000**
March 31, 2025	**$27,100,000**
June 30, 2025	**$32,100,000**
September 30, 2025	**$35,100,000**
December 31, 2025	**$38,100,000**

Exhibit 4.4
EXECUTION VERSION

NEITHER THIS SECURITY NOR THE SECURITIES FOR WHICH THIS SECURITY IS EXERCISABLE HAVE BEEN REGISTERED WITH THE SECURITIES AND EXCHANGE COMMISSION OR THE SECURITIES COMMISSION OF ANY STATE IN RELIANCE UPON AN EXEMPTION FROM REGISTRATION UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"), AND, ACCORDINGLY, MAY NOT BE OFFERED OR SOLD EXCEPT PURSUANT TO AN EFFECTIVE REGISTRATION STATEMENT UNDER THE SECURITIES ACT OR PURSUANT TO AN AVAILABLE EXEMPTION FROM, OR IN A TRANSACTION NOT SUBJECT TO, THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT AND IN ACCORDANCE WITH APPLICABLE STATE SECURITIES LAWS. THIS SECURITY AND THE SECURITIES ISSUABLE UPON EXERCISE OF THIS SECURITY MAY BE PLEDGED IN CONNECTION WITH A BONA FIDE MARGIN ACCOUNT OR OTHER LOAN SECURED BY SUCH SECURITIES TO THE EXTENT PERMITTED UNDER THE SECURITIES PURCHASE AGREEMENT DATED MARCH 3, 2023, AMONG THE COMPANY AND THE PURCHASERS SIGNATORY THERETO.

COMMON STOCK PURCHASE WARRANT

22ND CENTURY GROUP, INC.

Warrant Shares: _____ Issue Date: March 3, 2023
Initial Exercise Date: September 3, 2023

THIS **COMMON STOCK PURCHASE WARRANT** (the "***Warrant***") certifies that, for value received, _____or its assigns (the "***Holder***") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after September 3, 2023 (the "***Initial Exercise Date***") and on or prior to 5:00 p.m. (New York City time) on September 3, 2028 (the "***Termination Date***") but not thereafter, to subscribe for and purchase from 22nd Century Group, Inc., a Nevada corporation (the "***Company***"), up to 1,750,000 shares (as subject to adjustment hereunder, the "***Warrant Shares***") of the Company's common stock, $0.00001 par value (the "Common Stock"). The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price (as defined in ***Section 2(b)***).

Section 1. **Definitions**. Capitalized terms used and not otherwise defined herein shall have the meanings set forth in that certain Securities Purchase Agreement (the "***Purchase Agreement***"), dated March 3, 2023, among the Company and the Purchasers signatory thereto (each a "***Purchaser***" and collectively, the "***Purchasers***"). In addition, the following terms used in this Warrant shall have the following meanings:

"***Alternate Consideration***" has the meaning set forth in ***Section 3(c)***.

"***Attribution Parties***" has the meaning set forth in ***Section 2(e)***.

"***Base Share Price***" has the meaning set forth in ***Section 3(e)***.

"***Beneficial Ownership Limitation***" has the meaning set forth in ***Section 2(e)***.

"***Bid Price***" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:00 p.m. (New York City time)), (b) if the Common Stock is not then listed for trading on a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the holders of a majority in interest of the Warrants then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"***Buy-In***" has the meaning set forth in ***Section 2(d)(iv)***.

"***Change of Control Transaction***" has the meaning set forth in the Debentures.

"***Closing Date***" has the meaning set forth in the Purchase Agreement.

"***Common Stock***" has the meaning set forth in the preambles hereto.

"***Company***" has the meaning set forth in the preambles hereto.

"***Debentures***" has the meaning set forth in the Purchase Agreement.

"***Dilutive Issuance***" has the meaning set forth in ***Section 3(e)***.

"***Dilutive Issuance Notice***" has the meaning set forth in ***Section 3(e)***.

"***DWAC***" has the meaning set forth in ***Section 2(d)***

"***Event of Default***" has the meaning set forth in the Debentures.***(i)***.

"***Exchange Cap Payment Amount***" has the meaning set forth in ***Section 2(f)***.

"***Exchange Cap Shares***" has the meaning set forth in ***Section 2(f)***.

"***Exempt Issuance***" means the issuance of (a) shares of Common Stock, restricted stock or restricted stock units or options to employees, officers or directors of the Company pursuant to any stock or option plan duly adopted for such purpose, by a majority of the non-employee members of the Board of Directors or a majority of the members of a committee of non-employee directors established for such purpose for services rendered to the Company, (b) securities exercisable or exchangeable for or convertible into shares of Common Stock issued and outstanding on the date of this Agreement, provided that such securities have not been amended since the date

of this Agreement to increase the number of such securities or to decrease the exercise price, exchange price or conversion price of such securities (other than in connection with stock splits or combinations) or to extend the term of such securities, (c) securities issued pursuant to acquisitions, strategic transactions, or commercial or collaborative relationships approved by a majority of the disinterested directors of the Company, provided that such securities are issued as "restricted securities" (as defined in Rule 144) and carry no registration rights that require or permit the filing of any registration statement in connection therewith, and, provided that any such issuance shall only be to a Company (or to the equityholders of the Company) which is, itself or through its subsidiaries, an operating company or an owner of an asset in a business synergistic with the business of the Company and shall provide to the Company additional benefits in addition to the investment of funds, but shall not include a transaction in which the Company is issuing securities primarily for the purpose of raising capital or to an entity whose primary business is investing in securities.

"***Exercise Price***" has the meaning set forth in ***Section 2(b)***.

"***Fundamental Transaction***" has the meaning set forth in ***Section 3(c)***.

"***Holder***" has the meaning set forth in the preambles hereto.

"***Initial Exercise Date***" has the meaning set forth in the preambles hereto.

"***Notice of Exercise***" has the meaning set forth in ***Section 2(a)***.

"***Principal Market***" has the meaning set forth in the Debentures.

"***Purchase Agreement***" has the meaning set forth in ***Section 1***.

"***Purchase Rights***" has the meaning set forth in ***Section 3(b)***.

"***Put Notice***" has the meaning set forth in ***Section 2(g).***

"***Put Price***" has the meaning set forth in ***Section 2(g)***.

"***Put Right***" has the meaning set forth in ***Section 2(g)***.

"***Standard Settlement Period***" has the meaning set forth in ***Section 2(d)***

"***Subscription Amount***" has the meaning set forth in the Purchase Agreement.***(i)***.

"***Successor Entity***" has the meaning set forth in ***Section 3(c)***.

"***Termination Date***" has the meaning set forth in the preambles hereto.

"***Trading Market***" has the meaning set forth in the Debentures.

"***Transaction Documents***" has the meaning set forth in the Purchase Agreement.

"***Underlying Shares***" has the meaning set forth in ***Section 2(g)***.

"***VWAP***" has the meaning set forth in the Debentures.

"***Warrant***" has the meaning set forth in the preambles hereto.

"***Warrants***" means this Warrant collectively with the other Warrants issued pursuant to the Purchase Agreement.

"***Warrant Register***" has the meaning set forth in ***Section 4(c)***.

"***Warrant Share Delivery Date***" has the meaning set forth in ***Section 2(d)***

"***Warrant Shares***" has the meaning set forth in the preambles hereto. ***(i)***.

Section 2. **Exercise**.

a) **Exercise of Warrant**. Exercise of the purchase rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form annexed hereto (the "***Notice of Exercise***"). Within the earlier of (i) two (2) Trading Days and (ii) the number of Trading Days comprising the Standard Settlement Period following the date of exercise as aforesaid, the Holder shall deliver the aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer unless the cashless exercise procedure specified in ***Section 2(c)*** below is specified in the applicable Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within three (3) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

b) **Exercise Price**. The exercise price per share of Common Stock under this Warrant shall be $1.275, subject to adjustment hereunder (the "***Exercise Price***").

c) **Cashless Exercise**. If at the time of exercise hereof there is no effective registration statement registering, or the prospectus contained therein is not available for the resale of the Warrant Shares by the Holder, then this Warrant may also be exercised, in whole or in part, at such time by means of a "cashless exercise" in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

(A) as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to ***Section 2(a)*** hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to ***Section 2(a)*** hereof on a Trading Day prior to the opening of "regular trading hours" (as defined in Rule 600 of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) at the option of the Holder, either (y) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (z) the Bid Price of the Common Stock on the principal Trading Market as reported by Bloomberg as of the time of the Holder's execution of the applicable Notice of Exercise if such Notice of Exercise is executed during "regular trading hours" on a Trading Day and is delivered within two (2) hours thereafter (including until two (2) hours after the close of "regular trading hours" on a Trading Day) pursuant to ***Section 2(a)*** hereof or (iii) the VWAP on the date of the applicable Notice of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to ***Section 2(a)*** hereof after the close of "regular trading hours" on such Trading Day;

(B) the Exercise Price of this Warrant, as adjusted hereunder; and

(X) the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with *Section 3(a)(9)* of the Securities Act, the Warrant Shares shall take on the characteristics of the Warrants being exercised, and the holding period of the Warrant Shares being issued may be tacked on to the holding period of this Warrant. The Company agrees not to take any position contrary to this ***Section 2(c)***.

d) **Mechanics of Exercise**.

i. **Delivery of Warrant Shares Upon Exercise**. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Company's transfer agent (the "Transfer Agent") to the Holder by crediting the account of the Holder's or its designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system ("***DWAC***") if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance

of the Warrant Shares to or resale of the Warrant Shares by the Holder or (B) the Warrant Shares are eligible for resale by the Holder without volume or manner of sale limitations pursuant to Rule 144 (assuming cashless exercise of the Warrant), and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the latest of (i) two (2) Trading Days after delivery of the Notice of Exercise, (ii) the number of days comprising the Standard Settlement Period after the delivery to the Company of the Notice of Exercise and (iii) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "***Warrant Share Delivery Date***"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. If the Company fails for any reason to deliver to the Holder the Warrant Shares subject to a Notice of Exercise by the Warrant Share Delivery Date, the Company shall pay to the Holder, in cash, as liquidated damages and not as a penalty, for each $1,000 of Warrant Shares subject to such exercise (based on the VWAP of the Common Stock on the date of the applicable Notice of Exercise), $5 per Trading Day (increasing to $10 per Trading Day on the third (3rd) Trading Day after the Warrant Share Delivery Date) for each Trading Day after such Warrant Share Delivery Date until such Warrant Shares are delivered or Holder rescinds such exercise. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "***Standard Settlement Period***" means the standard settlement period, expressed in a number of Trading Days, on the Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise.

ii. **Delivery of New Warrants Upon Exercise**. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. **Rescission Rights**. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to ***Section 2(d)(i)*** by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise.

iv. **Compensation for Buy-In on Failure to Timely Deliver Warrant Shares Upon Exercise**. In addition to any other rights available to the Holder, if the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares in accordance with the provisions of ***Section 2(d)(i)*** above pursuant to an exercise on or before the Warrant Share Delivery Date (subject to receipt of the aggregate exercise price for the applicable exercise (other than in the case of a cashless exercise)), and if after such date the Holder is required by its broker to purchase (in an open market transaction or otherwise) or the Holder's brokerage firm otherwise purchases, shares of Common Stock to deliver in satisfaction of a sale by the Holder of the Warrant Shares which the Holder anticipated receiving upon such exercise (a "***Buy-In***"), then the Company shall (A) pay in cash to the Holder the amount, if any, by which (x) the Holder's total purchase price (including brokerage commissions, if any) for the shares of Common Stock so purchased exceeds (y) the amount obtained by multiplying (1) the number of Warrant Shares that the Company was required to deliver to the Holder in connection with the exercise at issue times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the Holder, either reinstate the portion of the Warrant and equivalent number of Warrant Shares for which such exercise was not honored (in which case such exercise shall be deemed rescinded) or deliver to the Holder the number of shares of Common Stock that would have been issued had the Company timely complied with its exercise and delivery obligations hereunder. For example, if the Holder purchases Common Stock having a total purchase price of $11,000 to cover a Buy-In with respect to an attempted exercise of shares of Common Stock with an aggregate sale price giving rise to such purchase obligation of $10,000, under clause (A) of the immediately preceding sentence the Company shall be required to pay the Holder $1,000. The Holder shall provide the Company written notice indicating the amounts payable to the Holder in respect of the Buy-In and, upon request of the Company, evidence of the amount of such loss. Nothing herein shall limit a Holder's right to pursue any other remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver shares of Common Stock upon exercise of the Warrant as required pursuant to the terms hereof.

v. **No Fractional Shares or Scrip**. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall, at its election, either pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the Exercise Price or round up to the next whole share.

vi. **Charges, Taxes and Expenses**. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or

other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; *provided*, *however*, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form attached hereto duly executed by the Holder and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

vii. **Closing of Books**. The Company will not close its stockholder books or records in any manner which prevents the timely exercise of this Warrant, pursuant to the terms hereof.

e) **Holder's Exercise Limitations**. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to ***Section 2*** or otherwise, to the extent that after giving effect to such issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's Affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's Affiliates (such Persons, "***Attribution Parties***")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its Affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its Affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its Affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this ***Section 2(e)***, beneficial ownership shall be calculated in accordance with *Section 13(d)* of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with *Section 13(d)* of the Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this ***Section 2(e)*** applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates

and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination. In addition, a determination as to any group status as contemplated above shall be determined in accordance with *Section 13(d)* of the Exchange Act and the rules and regulations promulgated thereunder. For purposes of this ***Section 2(e)***, in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written or oral request of a Holder, the Company shall within one (1) Trading Day confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its Affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "***Beneficial Ownership Limitation***" shall be 4.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon notice to the Company, may increase or decrease the Beneficial Ownership Limitation provisions of this ***Section 2(e)***, provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this ***Section 2(e)*** shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the sixty-first (61st) day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this ***Section 2(e)*** to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant.

f) **Principal Market Regulation**. In the event that the Company is prohibited from issuing any shares of Common Stock pursuant to this Warrant under the rules or regulations of the Principal Market (the "***Exchange Cap Shares***"), in lieu of issuing and delivering such Exchange Cap Shares to the Holder, the Company shall pay cash to the Holder in exchange for the cancellation of such portion of this Warrant exercisable into such Exchange Cap Shares (the "***Exchange Cap Payment Amount***") at a price equal to the sum of (x) the product of (A) such number of Exchange Cap Shares and (B) the highest price for the Common Stock on the Principal Market on any Trading Day during the period commencing on the date the Holder delivers the applicable Notice of Exercise with respect to such Exchange Cap Shares to the Company and ending on the date of such payment under this ***Section 2(f)*** and (y) to the extent the Holder purchases (in an open market transaction or otherwise) shares of Common Stock to deliver in satisfaction of a sale by the Holder of Exchange Cap Shares, any brokerage commissions and other out-of-pocket expenses, if any, of the Holder incurred in connection therewith.

g) **Put Provision**. Without prejudice to any other provisions of this Warrant, upon the earliest to occur of (i) the satisfaction in full of the Debentures, (ii) the consummation of a Change of Control Transaction or (iii) the occurrence, and during the continuance, of an Event of Default, and, each case, at any time during the thirty (30) Trading Days immediately thereafter, Holder may, at its sole option, elect (such right, the "***Put Right***") to require the Company to redeem up to the portion of this Warrant corresponding to ___ shares of Common Stock issuable upon exercise of this Warrant ("***Underlying Shares***") from the Holder for a purchase price equal to $1.00 (subject to appropriate adjustment for any stock split, stock dividend, stock combination, reverse stock split or similar event) per Underlying Share (the "***Put Price***") by delivering of a written notice to the Company (the "***Put Notice***"). The Put Price shall be due and in payable in cash within three (3) Trading Days after the Company's receipt of a valid Put Notice.

Section 3. **Certain Adjustments**.

a) **Stock Dividends and Splits**. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each case the Exercise Price shall be multiplied by a fraction of which the numerator shall be the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this ***Section 3(a)*** shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) **Subsequent Rights Offerings**. In addition to any adjustments pursuant to ***Section 3(a)*** above, if at any time the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to the record holders of any class of shares of Common Stock (the "***Purchase Rights***"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (*provided*, *however*, that to the extent that

the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) **Fundamental Transaction**. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company (and all of its Subsidiaries, taken as a whole), directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the outstanding shares of Common Stock (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "***Fundamental Transaction***"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in ***Section 2(e)*** on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "***Alternate Consideration***") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in ***Section 2(e)*** on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any

exercise of this Warrant following such Fundamental Transaction. The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "***Successor Entity***") to assume in writing all of the obligations of the Company under this Warrant and the other Transaction Documents in accordance with the provisions of this ***Section 3(c)*** pursuant to written agreements in form and substance reasonably satisfactory to the Holder and approved by the Holder (without unreasonable delay) prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of Common Stock acquirable and receivable upon exercise of this Warrant (without regard to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for the Company (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant and the other Transaction Documents referring to the "Company" shall refer instead to the Successor Entity), and the Successor Entity may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant and the other Transaction Documents with the same effect as if such Successor Entity had been named as the Company herein.

d) **Calculations**. All calculations under this ***Section 3*** shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this ***Section 3*** , the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

e) **Dilutive Issuances**. If the Company or any Subsidiary, as applicable, at any time while this Warrant is outstanding, shall sell or grant any option to purchase, or sell or grant any right to reprice, or otherwise dispose of or issue (or announce any offer, sale, grant or any option to purchase or other disposition) any Common Stock or Common Stock Equivalents, at an effective price per share less than the Exercise Price then in effect (such lower price, the "***Base Share Price***" and such issuances collectively, a "***Dilutive Issuance***") (it being understood and agreed that if the holder of the Common Stock or Common Stock Equivalents so issued shall at any time, whether by operation of purchase price adjustments, reset provisions, floating conversion, exercise or exchange prices or otherwise, or due to warrants, options or rights per share which are issued in connection with such issuance, be entitled to receive shares of Common Stock at an effective price per share that is less than the Exercise Price, such issuance shall be deemed to have occurred for less than the Exercise Price on such date of the Dilutive Issuance at such effective price), then simultaneously with the consummation (or, if earlier, the announcement) of

each Dilutive Issuance, the Exercise Price shall be reduced and only reduced to equal the Base Share Price, and the number of Warrant Shares issuable hereunder shall be increased such that the aggregate Exercise Price payable hereunder, after taking into account the decrease in the Exercise Price, shall be equal to the aggregate Exercise Price prior to such adjustment. Such adjustment shall be made whenever such Common Stock or Common Stock Equivalents are issued or, if earlier, when such issuance is announced. Notwithstanding the foregoing, no adjustments shall be made, paid or issued under this ***Section 3(e)*** in respect of an Exempt Issuance or an issuance of shares of Common Stock in a registered "at-the-market" offering. The Company shall notify the Holder, in writing, no later than the Trading Day following the issuance or deemed issuance of any Common Stock or Common Stock Equivalents subject to this ***Section 3(e)***, indicating therein the applicable issuance price, or applicable reset price, exchange price, conversion price and other pricing terms (such notice, the "***Dilutive Issuance Notice***"). For purposes of clarification, whether or not the Company provides a Dilutive Issuance Notice pursuant to this ***Section 3(e)***, upon the occurrence of any Dilutive Issuance, the Holder is entitled to receive a number of Warrant Shares based upon the Base Share Price regardless of whether the Holder accurately refers to the Base Share Price in the Notice of Exercise. Notwithstanding anything contained in this ***Section 3(e)*** to the contrary, no adjustment pursuant to this ***Section*** shall result in the exercise price being reduced to less than $0.855.

f) **Notice to Holder**.

i. **Adjustment to Exercise Price**. Whenever the Exercise Price is adjusted pursuant to any provision of this ***Section 3***, the Company shall promptly deliver to the Holder by email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment.

ii. **Notice to Allow Exercise by Holder**. If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the Common Stock including a distribution of its assets (or rights to acquire its assets) to holders of shares of Common Stock, by way of return of capital or otherwise (including, without limitation, any distribution of cash, stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement, scheme of arrangement or other similar transaction, (B) the Company shall declare a special nonrecurring cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs

of the Company, then, in each case, the Company shall cause to be delivered by email to the Holder at its last email address as it shall appear upon the Warrant Register of the Company, at least twenty (20) calendar days prior to the applicable record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, non-public information regarding the Company or any of the Subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

Section 4. **Transfer of Warrant; Registration Rights**.

a) **Transferability**. Subject to compliance with any applicable securities laws and the conditions set forth in ***Section 4(d)*** hereof, this Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new Warrant or Warrants in the name of the assignee or assignees, as applicable, and in the denomination or denominations specified in such instrument of assignment and shall issue to the assignor a new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder delivers a duly executed Assignment Form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued. The Company reserves the right to refuse to transfer any Warrant if such transfer would be in violation of any securities laws, including but not limited to the Securities Act.

b) **New Warrants**. This Warrant may be divided or combined with other Warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new Warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with ***Section 4(a)***, as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new Warrant or Warrants in exchange for the Warrant or Warrants to be divided or combined in accordance with such notice. All Warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) **Warrant Register**. The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the "***Warrant Register***"), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

d) **Transfer Restrictions**. If, at the time of the surrender of this Warrant in connection with any transfer of this Warrant, the transfer of this Warrant shall not be either (i) registered pursuant to an effective registration statement under the Securities Act and under applicable state securities or blue sky laws or (ii) eligible for resale without volume or manner-of-sale restrictions or current public information requirements pursuant to Rule 144, the Company may require, as a condition of allowing such transfer, that (a) the Holder or transferee of this Warrant, as the case may be, furnish to the Company a written opinion of counsel (which opinion shall be in form, substance and scope customary for opinions of counsel in comparable transactions) to the effect that such transfer may be made without registration under the Securities Act and under applicable state securities or blue sky laws, (b) that the Holder or transferee execute and deliver to the Company an investment letter in form and substance acceptable to the Company and (c) that the transferee be an "accredited investor" as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7), or (a)(8) promulgated under the Securities Act or a qualified institutional buyer as defined in Rule 144A(a) under the Securities Act. The first Holder of this Warrant, by taking and holding the same, represents to the Company that such Holder is an "accredited investor" as defined in Rule 501(a) promulgated under the Securities Act and is acquiring this Warrant for investment purposes and not with a view to the distribution thereof.

e) **Representation by the Holder**. The Holder, by the acceptance hereof, represents and warrants that it is acquiring this Warrant and, upon any exercise hereof, will acquire the Warrant Shares issuable upon such exercise, for its own account and not with a view to or for distributing or reselling such Warrant Shares or any part thereof in violation of the Securities Act or any applicable state securities law, except pursuant to sales registered or exempted under the Securities Act.

Section 5. **Miscellaneous**.

a) **No Rights as Stockholder Until Exercise; No Settlement in Cash**. This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a

stockholder of the Company prior to the exercise hereof as set forth in ***Section 2(d)(i)***, except as expressly set forth in ***Section 3***. Without limiting the rights of a Holder to receive Warrant Shares on a "cashless exercise," and to receive the cash payments contemplated pursuant to ***Section 2(d)(i)*** and ***Section 2(d)(iv)***, in no event will the Company be required to net cash settle an exercise of this Warrant.

b) **Loss, Theft, Destruction or Mutilation of Warrant**. The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, of indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) **Saturdays, Sundays, Holidays, etc**. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) **Authorized Shares**.

The Company covenants that, during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any purchase rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the purchase rights under this Warrant. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the purchase rights represented by this Warrant will, upon exercise of the purchase rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued, fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to

protect the rights of Holder as set forth in this Warrant against impairment. Without limiting the generality of the foregoing, the Company will (i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) **Governing Law; Jurisdiction**. *Sections 5.8* and *5.21* of the Purchase Agreement are incorporated herein by reference and made a part hereof *mutatis mutandis*.

f) **Restrictions**. The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

g) **Nonwaiver and Expenses**. No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

h) **Notices**. Any and all notices or other communications or deliveries to be provided by the holders hereunder including, without limitation, any Notice of Exercise, shall be made in accordance with *Section 5.3* of the Purchase Agreement. To the extent that any notice provided hereunder constitutes, or contains, material, non-public information regarding the Company or any subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K.

i) **Limitation of Liability**. No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of

the Company, whether such liability is asserted by the Company or by creditors of the Company.

j) **Remedies**. The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

k) **Successors and Assigns**. Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

l) **Amendment**. This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company and the Holder.

m) **Severability**. Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

n) **Headings**. The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

****

(*Signature Page Follows*)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

22ND CENTURY GROUP, INC.

By: /s/ Peter Ferola
Name: Peter Ferola
Title: General Counsel & Corporate Secretary

EXHIBIT A

NOTICE OF EXERCISE

TO: 22ND CENTURY GROUP, INC.

(1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.

(2) Payment shall take the form of (check applicable box):

[ ] in lawful money of the United States; or

[ ] if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in ***Section 2(c)***, to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in ***Section 2(c)***.

(3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:

_____

The Warrant Shares shall be delivered to the following DWAC Account Number:

_____

_____

_____

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____
Signature of Authorized Signatory of Investing Entity: _____
Name of Authorized Signatory: _____
Title of Authorized Signatory: _____
Date: _____

EXHIBIT B

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____

Holder's Signature: _____

Holder's Address: _____

Exhibit 4.5

NEITHER THIS SECURITY NOR THE SECURITIES FOR WHICH THIS SECURITY IS EXERCISABLE HAVE BEEN REGISTERED WITH THE SECURITIES AND EXCHANGE COMMISSION OR THE SECURITIES COMMISSION OF ANY STATE IN RELIANCE UPON AN EXEMPTION FROM REGISTRATION UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"), AND, ACCORDINGLY, MAY NOT BE OFFERED OR SOLD EXCEPT PURSUANT TO AN EFFECTIVE REGISTRATION STATEMENT UNDER THE SECURITIES ACT OR PURSUANT TO AN AVAILABLE EXEMPTION FROM, OR IN A TRANSACTION NOT SUBJECT TO, THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT AND IN ACCORDANCE WITH APPLICABLE STATE SECURITIES LAWS. THIS SECURITY AND THE SECURITIES ISSUABLE UPON EXERCISE OF THIS SECURITY MAY BE PLEDGED IN CONNECTION WITH A BONA FIDE MARGIN ACCOUNT OR OTHER LOAN SECURED BY SUCH SECURITIES.

COMMON STOCK PURCHASE WARRANT

22ND CENTURY GROUP, INC.

Warrant Shares: 675,000

Issue Date: March 3, 2023
Initial Exercise Date: September 3, 2023

THIS **COMMON STOCK PURCHASE WARRANT** (the "***Warrant***") certifies that, for value received, Omnia Capital LP or its assigns (the "***Holder***") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after September 3, 2023 (the "***Initial Exercise Date***") and on or prior to 5:00 p.m. (New York City time) on September 3, 2030 (the "***Termination Date***") but not thereafter, to subscribe for and purchase from 22nd Century Group, Inc., a Nevada corporation (the "***Company***"), up to 675,000 shares (as subject to adjustment hereunder, the "***Warrant Shares***") of the Company's common stock, $0.00001 par value (the "***Common Stock***"). The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price (as defined in ***Section 2(b)***).

Section 1. **Definitions**. The following terms used in this Warrant shall have the following meanings:

"***Alternate Consideration***" has the meaning set forth in ***Section 3(c)***.

"***Attribution Parties***" has the meaning set forth in ***Section 2(e)***.

"***Base Share Price***" has the meaning set forth in ***Section 3(e)***.

"***Beneficial Ownership Limitation***" has the meaning set forth in ***Section 2(e)***.

"***Bid Price***" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:00 p.m. (New York City time)), (b) if the Common Stock is not then listed for trading on a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX as applicable, (c) if the Common Stock is not then quoted for trading on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holder and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"***Change of Control Transaction***" means the occurrence after the date hereof of any of (a) an acquisition after the date hereof by an individual or legal entity or "group" (as described in Rule 13d-5(b)(1) promulgated under the Exchange Act) of effective control (whether through legal or beneficial ownership of capital stock of the Company, by contract or otherwise) of in excess of 50% of the voting securities of the Company, (b) the Company merges into or consolidates with any other Person, or any Person merges into or consolidates with the Company and, after giving effect to such transaction, the stockholders of the Company immediately prior to such transaction own less than 50% of the aggregate voting power of the Company or the successor entity of such transaction, or (c) the Company disposes of all or substantially all of its assets to another Person.

"***Common Stock***" has the meaning set forth in the preambles hereto.

"***Common Stock Equivalents***" means any securities of the Company or the Subsidiaries which would entitle the holder thereof to acquire at any time Common Stock, including, without limitation, any debt, preferred stock, right, option, warrant or other instrument that is at any time convertible into or exercisable or exchangeable for, or otherwise entitles the holder thereof to receive, Common Stock.

"***Company***" has the meaning set forth in the preambles hereto.

"***Dilutive Issuance***" has the meaning set forth in ***Section 3(e)***.

"***Dilutive Issuance Notice***" has the meaning set forth in ***Section 3(e)***.

"***DWAC***" has the meaning set forth in ***Section 2(d)(i)***

"***Event of Default***" has the meaning set forth in the Promissory Note.

"***Exchange Cap***" has the meaning set forth in ***Section 2(f)***.

"***Exchange Cap Payment Amount***" has the meaning set forth in ***Section 2(f)***.

"***Exchange Cap Shares***" has the meaning set forth in ***Section 2(f)***.

"***Exempt Issuance***" means the issuance of (a) shares of Common Stock, restricted stock or restricted stock units or options to employees, officers or directors of the Company pursuant to any stock or option plan duly adopted for such purpose, by a majority of the non-employee members of the Board of Directors or a majority of the members of a committee of non-employee directors established for such purpose for services rendered to the Company, (b) securities exercisable or exchangeable for or convertible into shares of Common Stock issued and outstanding on the date of this Agreement, provided that such securities have not been amended since the date of this Agreement to increase the number of such securities or to decrease the exercise price, exchange price or conversion price of such securities (other than in connection with stock splits or combinations) or to extend the term of such securities, and (c) securities issued pursuant to acquisitions, strategic transactions, or commercial or collaborative relationships approved by a majority of the disinterested directors of the Company, provided that such securities are issued as "restricted securities" (as defined in Rule 144) and carry no registration rights that require or permit the filing of any registration statement in connection therewith, provided that any such issuance shall only be to a Company (or to the equity holders of the Company) which is, itself or through its subsidiaries, an operating company or an owner of an asset in a business synergistic with the business of the Company and shall provide to the Company additional benefits in addition to the investment of funds, but shall not include a transaction in which the Company is issuing securities primarily for the purpose of raising capital or to an entity whose primary business is investing in securities.

"***Exercise Price***" has the meaning set forth in ***Section 2(b)***.

"***Fundamental Transaction***" has the meaning set forth in ***Section 3(c)***.

"***Holder***" has the meaning set forth in the preambles hereto.

"***Initial Exercise Date***" has the meaning set forth in the preambles hereto.

"***Notice of Exercise***" has the meaning set forth in ***Section 2(a)***.

"***Person***" means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

"***Principal Market***" means the Nasdaq Capital Market or such other Trading Market where the Common Stock is then listed or quoted.

"***Promissory Note***" means that certain Subordinated Promisorry Noted dated March 3, 2023 made by the Company in favor of Omnia Capital LP.

"***Purchase Rights***" has the meaning set forth in ***Section 3(b)***.

"***Put Notice***" has the meaning set forth in ***Section 2(f)***.

"***Put Price***" has the meaning set forth in ***Section 2(g)***.

"***Put Right***" has the meaning set forth in ***Section 2(f)***.

"***Standard Settlement Period***" has the meaning set forth in ***Section 2(d)i)***.

"***Successor Entity***" has the meaning set forth in ***Section 3(c)***.

"***Termination Date***" has the meaning set forth in the preambles hereto.

"***Trading Day***" means a day on which the principal Trading Market is open for trading.

"***Trading Market***" means any of the following markets or exchanges on which the Common Stock is listed or quoted for trading on the date in question: the NYSE American, the Nasdaq Global Market, the Nasdaq Global Select Market, the New York Stock Exchange or the Principal Market (or any successors to any of the foregoing).

"***Underlying Shares***" has the meaning set forth in ***Section 2(f)***.

"***VWAP***" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg (based on a Trading Day from 9:30 a.m. (local time in New York City, New York) to 4:00 p.m. (local time in New York City, New York)), (b) if NASDAQCM is not a Trading Market, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on NASDAQCM, (c) if the Common Stock is not then listed or quoted for trading on NASDAQCM and if prices for the Common Stock are then reported in the "Pink Sheets" published by OTC Markets Group, Inc. (or a similar organization or agency succeeding to its functions of reporting prices), the most recent Bid Price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holder and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"***Warrant***" has the meaning set forth in the preambles hereto.

"***Warrant Register***" has the meaning set forth in ***Section 4(c)***.

"***Warrant Share Delivery Date***" has the meaning set forth in ***Section 2(d)i)***.

"***Warrant Shares***" has the meaning set forth in the preambles hereto.

Section 2. **Exercise**.

a) **Exercise of Warrant**. Exercise of the Purchase Rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form annexed hereto (the "***Notice of Exercise***"). Within the earlier of (i) two (2) Trading Days and (ii) the number of Trading Days comprising the Standard Settlement Period following the date of exercise as aforesaid, the Holder shall deliver the

aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer unless the cashless exercise procedure specified in ***Section 2(c)*** below is specified in the applicable Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within five (5) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

b) **Exercise Price**. The exercise price per share of Common Stock under this Warrant shall be $0.855, subject to adjustment hereunder (the "***Exercise Price***").

c) **Cashless Exercise**. If at the time of exercise hereof there is no effective registration statement registering, or the prospectus contained therein is not available for the resale of the Warrant Shares by the Holder, then this Warrant may also be exercised, in whole or in part, at such time by means of a "cashless exercise" in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

(A) = as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to ***Section 2(a)*** hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to ***Section 2(a)*** hereof on a Trading Day prior to the opening of "regular trading hours" (as defined in Rule 600 of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) at the option of the Holder, either (y) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (z) the Bid Price of the Common Stock on the principal Trading Market as reported by Bloomberg as of the time of the Holder's execution of the applicable Notice of Exercise if such Notice of Exercise is executed during "regular trading hours" on a Trading Day and is delivered within two (2) hours thereafter (including until two (2) hours after the close of "regular trading hours" on a Trading Day) pursuant to ***Section 2(a)*** hereof or (iii) the VWAP on the date of the applicable Notice

of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to ***Section 2(a)*** hereof after the close of "regular trading hours" on such Trading Day;

(B) = the Exercise Price of this Warrant, as adjusted hereunder; and

(X) = the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with *Section 3(a)(9)* of the Securities Act, the Warrant Shares shall take on the characteristics of the Warrant being exercised, and the holding period of the Warrant Shares being issued may be tacked on to the holding period of this Warrant. The Company agrees not to take any position contrary to this ***Section 2(c)***.

d) **Mechanics of Exercise**.

i. **Delivery of Warrant Shares Upon Exercise**. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Company's transfer agent (the "***Transfer Agent***") to the Holder by crediting the account of the Holder's or its designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system ("***DWAC***") if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance of the Warrant Shares to or resale of the Warrant Shares by the Holder or (B) the Warrant Shares are eligible for resale by the Holder without volume or manner of sale limitations pursuant to Rule 144 (assuming cashless exercise of the Warrant), and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the latest of (i) two (2) Trading Days after delivery of the Notice of Exercise, (ii) the number of days comprising the Standard Settlement Period after the delivery to the Company of the Notice of Exercise and (iii) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "***Warrant Share Delivery Date***"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "***Standard Settlement Period***" means the standard settlement period, expressed in a number of Trading Days, on the

Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise.

ii. **Delivery of New Warrants Upon Exercise**. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. Rescission Rights. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to ***Section 2(d)(i)*** by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise.

iv. **No Fractional Shares or Scrip**. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall, at its election, either pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the Exercise Price or round up to the next whole share.

v. **Charges, Taxes and Expenses**. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; *provided*, *however*, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form attached hereto duly executed by the Holder, and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

vi. **Closing of Books**. The Company will not close its stockholder books or records in any manner which prevents the timely exercise of this Warrant, pursuant to the terms hereof.

e) **Holder's Exercise Limitations**. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to ***Section 2*** or otherwise, to the extent that after giving effect to such

issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's affiliates (such Persons, "***Attribution Parties***")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this ***Section 2(e)***, beneficial ownership shall be calculated in accordance with *Section 13(d)* of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with *Section 13(d)* of the Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this ***Section 2(e)*** applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any affiliates and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination. In addition, a determination as to any group status as contemplated above shall be determined in accordance with *Section 13(d)* of the Exchange Act and the rules and regulations promulgated thereunder. For purposes of this ***Section 2(e)***, in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written or oral request of a Holder, the Company shall within one (1) Trading Day confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "***Beneficial Ownership Limitation***" shall be 4.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon notice to the Company, may increase or decrease the Beneficial Ownership

Limitation provisions of this ***Section 2(e)***, provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this ***Section 2(e)*** shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the sixty-first (61st) day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this ***Section 2(e)*** to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant.

f) **Principal Market Regulation**. The Company shall not issue any shares of Common Stock upon the exercise of this Warrant if the issuance of such shares of Common Stock (taken together with the issuance of any other shares that are required to be aggregated with the issuance of the shares of Common Stock issuable upon exercise of the Warrant) would exceed the aggregate number of shares of Common Stock which the Company may issue upon exercise or conversion or otherwise pursuant to the terms of this Warrant (as the case may be) without breaching the Company's obligations under the rules or regulations of the Principal Market (the number of shares which may be issued without violating such rules and regulations, the "***Exchange Cap***"), except that such limitation shall not apply in the event that the Company (A) obtains the approval of its stockholders as required by the applicable rules of the Principal Market for issuances of shares of Common Stock in excess of such amount or (B) obtains a written opinion from outside counsel to the Company that such approval is not required, which opinion shall be reasonably satisfactory to the Holder. Until such approval or such written opinion is obtained, the Holder shall not be issued in the aggregate, pursuant to this Warrant, shares of Common Stock in an amount greater than the Exchange Cap as of the Issue Date. In the event that the Holder shall sell or otherwise transfer this Warrant, the restrictions of the prior sentence shall apply to such transferee. In the event that the Company is prohibited from issuing any shares of Common Stock pursuant to this ***Section 2(f)*** (the "***Exchange Cap Shares***"), in lieu of issuing and delivering such Exchange Cap Shares to the Holder, the Company shall pay cash to the Holder in exchange for the cancellation of such portion of this Warrant exercisable into such Exchange Cap Shares (the "***Exchange Cap Payment Amount***") at a price equal to the sum of (x) the product of (A) such number of Exchange Cap Shares and (B) the highest price for the Common Stock on the Principal Market on any Trading Day during the period commencing on the date the Holder delivers the applicable Notice of Exercise with respect to such Exchange Cap Shares to the Company and ending on the date of such payment under this ***Section 2(f)*** and (y) to the extent the Holder purchases (in an open market transaction or otherwise) shares of Common Stock to deliver in satisfaction of a sale by the Holder of Exchange Cap Shares, any brokerage commissions and other out-of-pocket expenses, if any, of the Holder incurred in connection therewith.

g) **Put Provision**. Without prejudice to any other provisions of this Warrant, upon the satisfaction in full of the Promissory Note, or at any time during the thirty (30) Trading Days immediately thereafter, Holder may, at its sole option, elect (such right, the

"***Put Right***") to require the Company to redeem any unexercised portion of this Warrant ("***Underlying Shares***") from the Holder for a purchase price equal to $2.00 (subject to appropriate adjustment for any stock split, stock dividend, stock combination, reverse stock split or similar event) per Underlying Share (the "***Put Price***") by delivering of a written notice to the Company (the "***Put Notice***"). The Put Price shall be due and in payable in cash within three (3) Trading Days after the Company's receipt of a valid Put Notice.

Section 3. **Certain Adjustments**.

a) **Stock Dividends and Splits**. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each case the Exercise Price shall be multiplied by a fraction of which the numerator shall be the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this ***Section 3(a)*** shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) **Subsequent Rights Offerings**. In addition to any adjustments pursuant to ***Section 3(a)*** above, if at any time the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to the record holders of any class of shares of Common Stock (the "***Purchase Rights***"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (*provided*, *however*, that to the extent that the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its

right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) **Fundamental Transaction**. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company (and all of its subsidiaries, taken as a whole), directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the outstanding shares of Common Stock (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "***Fundamental Transaction***"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in ***Section 2(e)*** on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "***Alternate Consideration***") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in ***Section 2(e)*** on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Fundamental Transaction. The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "***Successor Entity***") to assume in writing all of the obligations of the Company under this Warrant in accordance with the provisions of this ***Section 3(c)*** pursuant to written agreements in form and substance reasonably satisfactory to the Holder

and approved by the Holder (without unreasonable delay) prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of Common Stock acquirable and receivable upon exercise of this Warrant (without regard to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for the Company (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant referring to the "Company" shall refer instead to the Successor Entity), and the Successor Entity may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant with the same effect as if such Successor Entity had been named as the Company herein.

d) **Calculations**. All calculations under this ***Section 3*** shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this ***Section 3***, the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

e) **Dilutive Issuances**. If the Company or any subsidiary, as applicable, at any time while this Warrant is outstanding, shall sell or grant any option to purchase, or sell or grant any right to reprice, or otherwise dispose of or issue (or announce any offer, sale, grant or any option to purchase or other disposition) any Common Stock or Common Stock Equivalents, at an effective price per share less than the Exercise Price then in effect (such lower price, the "***Base Share Price***" and such issuances collectively, a "***Dilutive Issuance***") (it being understood and agreed that if the holder of the Common Stock or Common Stock Equivalents so issued shall at any time, whether by operation of purchase price adjustments, reset provisions, floating conversion, exercise or exchange prices or otherwise, or due to warrants, options or rights per share which are issued in connection with such issuance, be entitled to receive shares of Common Stock at an effective price per share that is less than the Exercise Price, such issuance shall be deemed to have occurred for less than the Exercise Price on such date of the Dilutive Issuance at such effective price), then simultaneously with the consummation (or, if earlier, the announcement) of each Dilutive Issuance, the Exercise Price shall be reduced to a price (calculated to the nearest cent) determined in accordance with the following formula: $P_2 = P_1 * (A+B) / (A+C)$, where:

(P_2) = Exercise Price immediately after Dilutive Issuance;

(P_1) = Exercise Price immediately before Dilutive Issuance;

(A) = Number of shares of Common Stock or Common Stock Equivalents deemed outstanding immediately before Dilutive Issuance;

(B) = Total consideration received by the Company with respect to the new Dilutive Issuance divided by P_1; and

(C) = Number of new shares of Common Stock or Common Stock Equivalents issued.

For purposes of this ***Section 3(e)***, the number of Warrant Shares issuable hereunder shall be increased such that the aggregate Exercise Price payable hereunder, after taking into account the decrease in the Exercise Price, shall be equal to the aggregate Exercise Price prior to such adjustment. Such adjustment shall be made whenever such Common Stock or Common Stock Equivalents are issued or, if earlier, when such issuance is announced. Notwithstanding the foregoing, no adjustments shall be made, paid or issued under this ***Section 3(e)*** in respect of an Exempt Issuance or an issuance of shares of Common Stock in a registered "at-the-market" offering. The Company shall notify the Holder, in writing, no later than the Trading Day following the issuance or deemed issuance of any Common Stock or Common Stock Equivalents subject to this ***Section 3(e)***, indicating therein the applicable issuance price, or applicable reset price, exchange price, conversion price and other pricing terms (such notice, the "***Dilutive Issuance Notice***"). For purposes of clarification, whether or not the Company provides a Dilutive Issuance Notice pursuant to this ***Section 3(e)***, upon the occurrence of any Dilutive Issuance, the Holder is entitled to receive a number of Warrant Shares based upon the Base Share Price regardless of whether the Holder accurately refers to the Base Share Price in the Notice of Exercise. Notwithstanding anything contained in this ***Section 3(e)***, no adjustment pursuant to this Section shall result in the exercise price being reduced to less than $0.855.

f) **Notice to Holder**.

i. **Adjustment to Exercise Price**. Whenever the Exercise Price is adjusted pursuant to any provision of this ***Section 3***, the Company shall promptly deliver to the Holder by email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment.

ii. **Notice to Allow Exercise by Holder**. If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the Common Stock, including a distribution of its assets (or rights to acquire its assets) to holders of shares of Common Stock, by way of return of capital or otherwise, including without limitation, any distribution of cash, stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement, scheme of arrangement or other similar transaction, (B) the Company shall declare a special nonrecurring

cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs of the Company, then, in each case, the Company shall cause to be delivered by email to the Holder at its last email address as it shall appear upon the Warrant Register of the Company, at least twenty (20) calendar days prior to the applicable record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, nonpublic information regarding the Company or any of its subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

Section 4. **Transfer of Warrant.**

a) **Transferability**. Subject to compliance with any applicable securities laws and the conditions set forth in ***Section 4(d)*** hereof, this Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new warrant or warrants in the name of the assignee or assignees, as applicable, and in the denomination or denominations specified in such instrument of assignment and shall issue to the assignor a

new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder delivers a duly executed Assignment Form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued. The Company reserves the right to refuse to transfer any Warrant if such transfer would be in violation of any securities laws, including but not limited to the Securities Act.

b) **New Warrants**. This Warrant may be divided or combined with other warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with ***Section 4(a)***, as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new warrant or warrants in exchange for the warrant or warrants to be divided or combined in accordance with such notice. All warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) **Warrant Register**. The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the "***Warrant Register***"), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

d) **Transfer Restrictions**. If, at the time of the surrender of this Warrant in connection with any transfer of this Warrant, the transfer of this Warrant shall not be either (i) registered pursuant to an effective registration statement under the Securities Act and under applicable state securities or blue sky laws or (ii) eligible for resale without volume or manner-of-sale restrictions or current public information requirements pursuant to Rule 144, the Company may require, as a condition of allowing such transfer, that (a) the Holder or transferee of this Warrant, as the case may be, furnish to the Company a written opinion of counsel (which opinion shall be in form, substance and scope customary for opinions of counsel in comparable transactions) to the effect that such transfer may be made without registration under the Securities Act and under applicable state securities or blue sky laws, (b) that the Holder or transferee execute and deliver to the Company an investment letter in form and substance acceptable to the Company and (c) that the transferee be an "accredited investor" as defined in Rule 501(a)(1), (a)(2), (a)(3), (a)(7), or (a)(8) promulgated under the Securities Act or a qualified institutional buyer as defined in Rule 144A(a) under the Securities Act. The first Holder of this Warrant, by taking and holding the same, represents to the Company that such Holder is an "accredited investor" as defined in Rule 501(a) promulgated under the Securities Act and is acquiring this Warrant for investment purposes and not with a view to the distribution thereof.

e) **Representation by the Holder**. The Holder, by the acceptance hereof, represents and warrants that it is acquiring this Warrant and, upon any exercise hereof, will acquire the Warrant Shares issuable upon such exercise, for its own account and not with a view to or for distributing or reselling such Warrant Shares or any part thereof in violation of the Securities Act or any applicable state securities law, except pursuant to sales registered or exempted under the Securities Act.

Section 5. **Miscellaneous**.

a) **No Rights as Stockholder Until Exercise; No Settlement in Cash**. This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a stockholder of the Company prior to the exercise hereof as set forth in ***Section 2(d)i)***, except as expressly set forth in ***Section 3***. Without limiting the rights of a Holder to receive Warrant Shares on a "cashless exercise," and to receive the cash payments contemplated pursuant to ***Section 2(d)i)***, in no event will the Company be required to net cash settle an exercise of this Warrant.

b) **Loss, Theft, Destruction or Mutilation of Warrant**. The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, of indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) **Saturdays, Sundays, Holidays, etc**. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) **Authorized Shares**.

The Company covenants that, during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any Purchase Rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the Purchase Rights under this Warrant. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the Purchase Rights represented by this Warrant will, upon exercise of the Purchase Rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued,

fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to protect the rights of Holder as set forth in this Warrant against impairment. Without limiting the generality of the foregoing, the Company will (i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) **Governing Law; Jurisdiction**. All questions concerning the construction, validity, enforcement and interpretation of this Warrant shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflicts of law thereof. Each party agrees that all legal proceedings concerning the interpretations, enforcement and defense of this Warrant (whether brought against a party hereto or its respective affiliates, directors, officers, stockholders, partners, members, employees or agents) shall be commenced exclusively in the state and federal courts sitting in the City of New York. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the City of New York, Borough of Manhattan for the adjudication of any dispute hereunder or in connection herewith, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is improper or is an inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Warrant and agrees that such service shall constitute good and sufficient

service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law.

f) WAIVER OF JURY TRIAL. IN ANY ACTION, SUIT, OR PROCEEDING IN ANY JURISDICTION BROUGHT BY ANY PARTY AGAINST ANY OTHER PARTY, THE PARTIES EACH KNOWINGLY AND INTENTIONALLY, TO THE GREATEST EXTENT PERMITTED BY APPLICABLE LAW, HEREBY ABSOLUTELY, UNCONDITIONALLY, IRREVOCABLY AND EXPRESSLY WAIVES FOREVER TRIAL BY JURY.

g) **Restrictions**. The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

h) **Nonwaiver and Expenses**. No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

i) **Notices**. Any and all notices or other communications or deliveries to be provided by the holders hereunder including, without limitation, any Notice of Exercise, shall be made in writing and shall be deemed given and effective on the earliest of: (a) the date of transmission, if such notice or communication is delivered via or email as set forth on the signature pages attached hereto at or prior to 5:30 p.m. (New York City time) on a business day, (b) the next business day after the date of transmission, if such notice or communication is delivered by email as set forth on the signature pages attached hereto on a day that is not a business day or later than 5:30 p.m. (New York City time) on any business day, (c) the second (2nd) business day following the date of mailing, if sent by a nationally recognized overnight courier service, or (d) upon actual receipt by the party to whom such notice is required to be given. The address for such notices and communications shall be as set forth on the signature pages attached hereto. To the extent that any notice provided hereunder constitutes, or contains, material, non-public information regarding the Company or any subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K.

j) **Limitation of Liability**. No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of the Company, whether such liability is asserted by the Company or by creditors of the Company.

k) **Remedies**. The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

l) **Successors and Assigns**. Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

m) **Amendment**. This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company and the Holder.

n) **Severability**. Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

o) **Headings**. The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

****

(*Signature Page Follows*)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

22ND CENTURY GROUP, INC.

By: /s/ Hugh Kinsman
Name: Hugh Kinsman
Title:Chief Financial Officer

EXHIBIT A

NOTICE OF EXERCISE

TO: 22ND CENTURY GROUP, INC.

(1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.

(2) Payment shall take the form of (check applicable box):

[ ] in lawful money of the United States; or

[ ] if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in ***Section 2(c)***, to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in ***Section 2(c)***.

(3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:

_____

The Warrant Shares shall be delivered to the following DWAC Account Number:

_____

_____

_____

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____
Signature of Authorized Signatory of Investing Entity: _____
Name of Authorized Signatory: _____
Title of Authorized Signatory: _____
Date: _____

EXHIBIT B

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____ ___, _____

Holder's Signature: _____

Holder's Address: _____

Exhibit 10.15

22nd CENTURY GROUP, INC.
EMPLOYMENT AGREEMENT

This EMPLOYMENT AGREEMENT ("**Agreement**") is dated as of November 11, 2022 between 22nd CENTURY GROUP, INC., a Nevada corporation ("**Company**") and John Miller ("**Employee**").

WHEREAS, the Employee provides consulting services to the Company as an independent contractor pursuant to an Executive Consulting Agreement dated as of May 4, 2022 (the "**Consulting Agreement**");

WHEREAS, the Company desires to engage the Employee as a full-time executive employee to provide services to the Company pursuant to the terms of this Agreement, and the Employee desires to accept such employment.

NOW, THEREFORE, in consideration of the covenants and agreements hereinafter set forth, the parties agree as follows:

1. EFFECTIVE DATE

The Employee's employment with the Company shall commence on November 11, 2022 (the "**Effective Date**").

2. EMPLOYMENT DUTIES AND TERM

2.1 General. As of the Effective Date, the Company employs the Employee as, and the Employee agrees to serve as, President of the Tobacco business unit (the "**Business Unit**") of the Company upon the terms and conditions specified in this Agreement. The Employee shall perform such duties and services for the Company as may be determined from time to time by the Company's Board of Directors (the "**Board**") and Chief Executive Officer ("**CEO**"), provided that such duties and services shall be consistent in all material respects with the Employee's position. The Employee agrees to serve the Company faithfully and to the best of his ability under the direction of the Board.

2.2 Primary Work Location. The Employee will work primarily from the Company's regional corporate office located in Jacksonville, Florida, but will be expected to travel for Company business to locations throughout the United States and internationally.

2.3 Exclusive Services. The Employee shall devote his full working time throughout the Employment Term (as defined in Section 2.4) to the performance of services for the Company. During the Employment Term, the Employee will not be employed by any other

person or entity, or be self-employed, without the prior approval of the Board. The Employee shall use his best efforts, judgment and energy to improve and advance the business and interests of the Company in a manner consistent with the duties of his position. Upon the Employee's execution of this Agreement and during the Employment Term, the Employee will disclose to the Company any existing or proposed participation or membership in trade or professional associations, and any existing or proposed appointments as a member of the board of directors (or similar governing body) of any for-profit or not-for-profit entity; all such participations, memberships and appointments shall be subject to approval by the CEO.

2.4 Employment Term. The Employee's employment under this Agreement shall commence as of the Effective Date and shall continue until the third (3rd) anniversary of the Effective Date (the "**Expiration Date**"), unless earlier terminated pursuant to Section 5 of this Agreement. For the purposes of this Agreement, "**Employment Term**" means the period beginning on the Effective Date and ending on the date that Employee's employment with the Company terminates for any reason.

3. COMPENSATION

3.1 Base Salary. During the Employment Term, the Employee shall be paid an annual base salary ("**Base Salary**") in the amount of $425,000, payable in accordance with the Company's payroll practices. Base Salary is subject to increase, from time to time, in the sole and absolute discretion of the Board.

3.2 Cash Bonus Opportunity. During the Employment Term, the Employee will be eligible to earn an annual cash bonus in an amount determined by the Compensation Committee of the Board, in consultation with the CEO, based on annual performance metrics and strategic goals for the Company and annual individual objectives for the Employee. Any cash bonus achieved in respect of a Company fiscal year will be earned by and paid to the Employee not later than 120 days following the end of the applicable Company fiscal year, provided that, if the Employment Term ends prior to payment for any reason, the Employee shall earn or be entitled to receive only the portion of the cash bonus otherwise earned by the Employee through the date of Employee's termination of employment with the Company. Notwithstanding the foregoing, Employee shall not be entitled to any cash bonus if Employee is terminated with cause.

3.3 Performance Shares. The Employee will be eligible to receive an award of Performance Shares under Company's 2021 Omnibus Equity Incentive Plan, as it may be amended from time to time (the "**2021 Plan**") as follows:

3.3.1 Contingent on the Employee's continued employment with the Company through the grant date, the Employee shall be granted 250,000 performance shares under Company's 2021 Plan, which shall vest on May 1, 2023, if (i) Company's business plan

revenue objective for the Business Unit for the prior 12-month period is met, (ii) at least four senior level strategic partnership discussions have been initiated, and (iii) the Employee remains employed by the Company through such vesting date (subject to Section 3.3.4 below).

3.3.2 Contingent on the Employee's continued employment with the Company through the grant date, Employee shall be granted an additional 250,000 performance shares under the 2021 Plan which shall vest on May 1, 2024, if (i) Company's business plan revenue objective for the Business Unit for the prior 12-month period is met, (ii) the strategic partnership discussions set forth in Section 3.3.1, above, continue, and (iii) the Employee remains employed by the Company through such vesting date (subject to Section 3.3.4 below).

3.3.3 Contingent on the Employee's continued employment with the Company through the grant date, Employee shall be granted an additional 250,000 performance shares under the 2021 Plan, which shall vest immediately upon the Company's entry into at least one substantive licensing agreement with a strategic partner for VLN®/Moonlight®, provided the Employee remains employed by the Company through such date (subject to Section 3.3.4 below).

3.3.4 All 750,000 performance shares set forth in Sections 3.3.1, 3.3.2 and 3.3.3 above shall vest upon the occurrence of (i) a "Change of Control" of the Company (as defined in the 2021 Plan); (ii) other acceleration events described in the 2021 Plan; (iii) a joint venture or definitive sale or strategic partnership of the Business Unit; or (iv) in the event Employee terminates his employment with the Company for "Good Reason" (as defined in the 2021 Plan).

3.3.5 If Employee's employment with the Company ends for any reason not described in Section 3.3.4 above, Employee shall not be entitled to retain any performance shares contemplated by this Section 3.3 other than the performance shares which have vested as of the date of Employee's termination.

Each performance share award contemplated by this Section 3.3, once granted, will be subject to the terms and conditions of the 2021 Plan and an individual award agreement governing such award (collectively, the "**Equity Documents**"), and, notwithstanding anything in this Section 3.3 to the contrary, in the event of any conflict between any term of this Agreement relating to the performance shares and any term of the Equity Documents, the Equity Documents will control.

3.4 Future Incentive Equity Awards. During the Employment Term, the Employee shall also be considered for additional incentive equity awards from time to time, in the sole and absolute discretion of the Compensation Committee of the Board. Each such award, if granted, will be subject to all of the terms and conditions of the Company's 2021 Plan or a successor plan, an

individual award agreement, and any other ancillary agreements that the Employee may be required to enter into as a condition of the award.

3.5 Reimbursement of Expenses. The Company shall reimburse the Employee for reasonable travel and other business expenses incurred by him during the Employment Term in the fulfillment of his duties hereunder upon presentation by the Employee of an itemized account of such expenditures, in accordance with Company practices and policies.

4. EMPLOYEE BENEFITS

The Employee shall, during the Employment Term, be included to the extent eligible thereunder in all employee benefit plans, programs or arrangements (including plans, programs or arrangements providing for retirement benefits, disability benefits, health and life insurance, or vacation and paid holidays) which shall from time to time be established by the Company for, or made available to, its management employees generally. Notwithstanding the foregoing, Company may modify or terminate any employee benefit plan at any time, in its sole and absolute discretion.

5. TERMINATION OF EMPLOYMENT

5.1 Termination Events.

5.1.1. By the Company. The Company may terminate the Employee's employment with the Company at any time for any reason, including for Cause (as hereinafter defined), without Cause (which, for the avoidance of doubt, will not include the automatic termination on the Expiration Date under Section 5.1.3 below), or upon the Employee's Disability (as hereinafter defined).

5.1.2. By the Employee. The Employee may resign from employment with the Company at any time for any reason.

5.1.3. Expiration of Term. The Employee's employment with the Company, if not earlier terminated, will end automatically on the Expiration Date.

5.1.4. Employee's Death. The Employee's employment with the Company will end automatically upon the Employee's death.

5.2 Termination Without Cause.

5.2.1 Severance Benefits. If the Employee's employment is terminated by the Company without Cause:

(i) In addition to any earned, prorated bonus, pursuant to Section 3.2, the Company shall continue to pay the Employee the Base Salary (at the rate in effect immediately prior to such termination) for a period of 12 months following the effective date of termination (such period being referred to hereinafter as the "**Severance Period**"). The payments shall occur in installments in the same amount in effect immediately prior to such termination and at the same regular payment intervals as the Employee's Base Salary was being paid on the Effective Date (not less frequently than monthly) and such installments shall be deemed a series of separate payments within the meaning of Treas. Reg. §1.409A-2(b)(2)(iii). The first installment payment of such severance will be made on the Company's first regularly scheduled payroll date next following the sixtieth (60th) calendar day after the effective date of termination.

(ii) If the Employee is eligible for and timely elects to continue health insurance coverage under the Company's applicable group health insurance plan pursuant to the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended ("COBRA"), then the Company shall directly pay, or reimburse Employee for, the COBRA premium for the Employee and Employee's covered dependents under such plan during the Severance Period, provided that (a) the Employee will be responsible for paying the same portion of the premium that the Company requires to be paid by its management employees under the applicable plan, and (b) the Company's obligation to pay or reimburse the Employee for such premiums will terminate on the date Employee becomes eligible to receive reasonably comparable health insurance coverage from a subsequent employer (and Employee agrees to promptly notify the Company of such eligibility). If the Company determines that it cannot provide the benefit required by this Section 5.2.1(ii) without potentially breaching the Company's applicable group health insurance contract, violating applicable law (including, without limitation, Section 2716 of the Public Health Service Act) or incurring an excise tax, the Company shall in lieu thereof during the Severance Period pay to the Employee a taxable monthly payment in an amount equal to the portion of the COBRA premium otherwise payable or reimbursable by the Company under this Section 5.2.1(ii).

(iii) The Employee shall have no further right to receive any other compensation or benefits after such termination of employment except as specifically determined in accordance with the terms of the employee benefit plans or programs of the Company. In the event of the Employee's death during the Severance Period, Base Salary continuation payments

under this Section 5.2.1 shall continue to be made during the remainder of the Severance Period to the beneficiary designated in writing for this purpose by the Employee or, if no such beneficiary is specifically designated, to the Employee's estate.

5.2.2 Termination of Severance Benefit. If, during the Severance Period, the Employee breaches any of his obligations under this Agreement (including, without limitation, the Employee's obligations under Section 6), the Company may, in addition to all other rights and remedies upon written notice to the Employee, terminate the Severance Period and cease to make any further payments or provide any benefits described in Section 5.2.1.

5.2.3 Release. The Company's obligation to make the Base Salary and provide health insurance benefits described in Section 5.2.1 shall be subject to the following conditions: (i) within 21 days after the effective date of termination or resignation, the Employee shall have executed and delivered to the Company a Termination Agreement and Release ("**Release**") then provided by the Company, which will be substantially in the form of Exhibit A attached hereto, and (ii) the Release shall not have been revoked by the Employee during the revocation period specified therein. If the Employee fails to deliver a fully executed Release to the Company before expiration of such 21 day period, or such release is revoked as permitted therein, then the Company will have no obligation to make any of the payments or provide any of the benefits specified in Section 5.2.1.

5.3 Termination for Cause. If the Employee's employment is terminated by the Company for Cause, the Employee shall be entitled only to payment of his Base Salary as then in effect through and including the date of termination or resignation, any accrued but unused paid time off subject to and in accordance with Company policy, and reimbursement for any unreimbursed eligible business expenses incurred through and including the date of termination or resignation subject to and in accordance with Company policy. Employee shall have no further right to receive any other compensation or benefits after such termination, except as determined in accordance with the terms of the employee benefit plans or programs of the Company.

5.4 Cause. Termination for "**Cause**" shall mean termination of the Employee's employment by the Company because of:

(i) any act or omission of the Employee that constitutes a breach by the Employee of any of his obligations under this Agreement, any other agreement with the Company or any of its affiliates (each, a "**Group Company**"), or any written Group Company policy, procedure or code of conduct, and failure to cure such breach after notice of, and a reasonable opportunity to cure, such breach (if determined to be susceptible of cure by the Board in its good faith discretion);

(ii) the willful failure or refusal of the Employee to perform the Employee's duties to the Group Companies;

(iii) the Employee's theft, dishonesty, fraud, embezzlement, willful misconduct, breach of fiduciary duty, or material falsification of any documents or records of any Group Company;

(iv) the Employee's misconduct, moral turpitude, gross negligence or malfeasance that has or, in the good faith judgment of the Board, could be expected to have, a material detrimental effect on a Group Company's reputation or business;

(v) the Employee's conviction of (including any plea of guilty or nolo contendere to), or indictment for, any criminal act involving fraud, dishonesty, misappropriation or moral turpitude, or any other act which, in the good faith determination of the Board, would render his continued employment by the Company damaging or detrimental to any Group Company;

(vi) the Employee's unauthorized use, misappropriation, destruction or diversion of any tangible or intangible asset or corporate opportunity of any Group Company (including the Employee's improper use or disclosure of a Group Company's confidential or proprietary information);

(vii) the Employee's willful failure to cooperate with the Company and its legal counsel in connection with any investigation or other legal or similar proceeding involving any Group Company; or

(viii) any other willful conduct by the Employee which is materially injurious to the financial condition or business reputation of, or is otherwise materially injurious to, any Group Company.

5.5 Termination by the Employee For Good Reason.

(i) This Agreement may be terminated by the Employee upon notice to the Company of any event constituting "Good Reason" as defined herein.

(ii) As used herein, the term "**Good Reason**" means: the failure of the Company to pay Employee's compensation in accordance with this Agreement without the prior written consent of the Employee; a material reduction in the Employee's Base Salary; a material reduction in the Employee's bonus opportunity; any material breach by the Company of any material provision of this Agreement or any material provision of any other agreement between the Employee and the Company; or a material, adverse change in the Employee's title, authority, duties, or responsibilities (other than temporarily while the Employee is physically or mentally incapacitated or as required by applicable law). Provided, however, that the Employee shall not

be deemed to have Good Reason pursuant to this provision unless the Employee gives the Company written notice that the specified conduct or event has occurred and making specific reference to this Section 5.5 and the Company fails to cure such conduct or event within thirty
(30) days of receipt of such notice.

(iii) In the event the Employee terminates this Agreement under this Section 5.5, Employee shall be entitled to the severance benefits described under Section 5.2, pertaining to Severance Benefits, provided that the Employee elects to comply with the Restrictive Covenants set forth in Section 6. If Employee disavows the Restrictive Covenants and chooses to compete with the Company in violation of the covenants set forth in Section 6, then Employee forfeits all Severance Benefits provided in Section 5.2.

5.6 Death or Disability**.** In the event of termination of employment by reason of death or Disability, the Employee (or his estate, as applicable) shall be entitled to Base Salary and benefits through the date of termination. Other benefits shall be determined in accordance with the benefit plans maintained by the Company, and the Company shall have no further obligation hereunder. For purposes of this Agreement, "**Disability**" means a physical or mental disability or infirmity of the Employee that, in the sole opinion of the Board, prevents (with or without reasonable accommodation) the normal performance of substantially all his material duties as an employee of the Company, which disability or infirmity shall exist for any continuous period of 90 days.

5.7 Resignation of Positions. Upon termination of Employee's employment with the Company for any reason, the Employee agrees to immediately resign from all positions and offices in which he is then serving the Company and its subsidiaries.

6. CONFIDENTIALITY, NONSOLICITATION AND NON- COMPETITION

6.1 Confidentiality. The Employee covenants and agrees with the Company that he will not any time during the Employment Term and thereafter, except in performance of his obligations to the Company hereunder or with the prior written consent of the Company, directly or indirectly, disclose any secret or Confidential Information that he may learn or has learned by reason of his association with the Company. The term "**Confidential Information**" includes information not previously made generally available to the public by the Company, with respect to the Company's products, facilities, applications and methods, trade secrets and other intellectual property, systems, procedures, manuals, confidential reports, product price lists, customer lists, technical information, financial information (including the revenues, costs or profits associated with any of the Company's products), business and strategic plans, prospects or opportunities, but shall exclude any information which the Company intentionally makes generally available to the public other than as a result of disclosure by the Employee in violation of this Section 6.1. The Employee will be released of his obligations under this Section 6.1 to

the extent the Employee is required to disclose under any applicable laws, regulations or directives of any government agency, tribunal or authority having jurisdiction in the matter or under subpoena or other process of law provided that the Employee provides the Company with prompt written notice of such requirement. In addition, the Employee will not be in breach of any obligations under Section 6.1, and will not be criminally or civilly liable under any Federal or state trade secret law, for the disclosure of Confidential Information that is made in confidence to a Federal, state or local government official, either directly or indirectly, or to an attorney, solely for the purpose of reporting or investigating a suspected violation of law involving the Company or is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. If the Employee files a lawsuit for retaliation by the Company for reporting a suspected violation of law involving the Company, the Employee may disclose Confidential Information, including trade secrets, to his attorney and use such Confidential Information in the court proceeding if such Confidential Information is filed under seal.

6.2 Acknowledgment of Company Assets. The Employee acknowledges that the Company, at the Company's expense, has acquired, created and maintains, and will continue to acquire, create and maintain, significant goodwill with its current and prospective customers, strategic partners, vendors and employees and significant Confidential Information, and that such goodwill and Confidential Information is valuable property of the Company. The Employee further acknowledges that to the extent such goodwill and Confidential Information will be generated through the Employee's efforts, such efforts will be funded by the Company and the Employee will be fairly compensated for such efforts. The Employee acknowledges that all goodwill developed by the Employee relative to the Company's customers, strategic partners, vendors and employees, and all Confidential Information developed by the Employee, shall be the sole and exclusive property of the Company and shall not be personal to the Employee. Accordingly, in order to afford the Company reasonable protection of such goodwill and of the Company's Confidential Information, the Employee agrees as follows:

6.2.1. No solicitation; Non-Interference. During the Employment Term and for a period of one year after termination of employment for any reason (such one-year period, the "**Post-Termination Restrictive Covenant Period**"), the Employee shall not, directly or indirectly, as an investor, lender, officer, director, manager, or as an employee, associate, consultant or agent of any individual or entity, or in any other capacity: (i) solicit or endeavor to entice away from the Company, or hire, any individual who is employed by the Company;
(ii) solicit or endeavor to entice away from the Company, or provide services to, any entity who or which is, or was within the then most recent 12-month period, a customer (or reasonably anticipated to become a customer) of the Company; (iii) interfere with the business relationship between the Company and any customer, strategic partner, supplier or vendor of the Company or attempt to persuade or encourage any customer, strategic partner, supplier or vendor of the Company to cease doing business with the Company or to engage in any activity competitive with the Company; or (iv) make or publish any disparaging remarks about the Company, its products, prospects or management.

6.2.2 Change of Control Activity. The Employee agrees that during the Post-Termination Restrictive Covenant Period, the Employee shall not, directly or indirectly, or in any individual or representative capacity, engage or otherwise participate in any Change of Control Activity with respect to the Company. "**Change of Control Activity**" means (a) effect, seek, offer or propose (whether publicly or otherwise) to effect, or cause or participate in, or in any way assist any other individual or entity to effect, seek, offer or propose (whether publicly or otherwise) to effect or participate in: (i) any acquisition of any securities (or beneficial ownership thereof) or all or substantially all of the assets of the Company, (ii) any tender or exchange offer, merger or other business combination involving the Company, (iii) any recapitalization, restructuring, liquidation, dissolution or other extraordinary transaction with respect to the Company, or (iv) any "solicitation" of "proxies" (as such terms are used in the proxy rules of the Securities and Exchange Commission) or consents to vote any voting securities of the Company;
(b) form, join or in any way participate in a "group" (as defined under the Securities Exchange Act of 1934, as amended) with respect to the securities of the Company; (c) make any public announcement with respect to, or submit an unsolicited proposal for or offer of (with or without condition), any extraordinary transaction involving the Company or its securities or assets; or (d) enter into any discussions or arrangements with any third party with respect to any of the foregoing.

6.2.3. Non-Competition. During the Employment Term and during the Post-Termination Restrictive Covenant Period, the Employee shall not, directly or indirectly, as an investor, lender, officer, director, manager, or as an employee, associate, consultant or agent of any individual or entity, or in any other capacity, (other than as an investor owning not more than a 1% interest in a publicly-traded entity), engage in the Restricted Business (as hereinafter defined) anywhere in the world other than on behalf of the Company. The Employee acknowledges and agrees that the Company conducts business throughout the world, that the Company's legitimate and protectable business interests are throughout the world, and therefore this Section 6.2.3 is intended to prohibit competitive activities by the Employee throughout the world. "**Restricted Business**" means research and product development with respect to, the manufacture, distribution, marketing or sale of, or the licensing of intellectual property related to, tobacco, hemp and/or cannabis products without the written consent of the Company.

6.3 Exclusive Property. The Employee confirms that all Confidential Information is and shall remain the exclusive property of the Company. All business records and documents (whether in paper or electronic media) kept or made by Employee relating to the business of the Company shall be and remain the property of the Company. Upon termination of the Employee's employment with the Company for any reason, the Employee shall promptly deliver to the Company all of the following that are in the Employee's possession or under his control: (i) all computers, telecommunication devices and other tangible property of the Company and its affiliates, and (ii) all documents and other materials, in whatever form, which include Confidential Information or which otherwise relate in whole or in part to the present or

prospective business of the Company, including but not limited to, drawings, graphs, charts, specifications, notes, reports, memoranda, and computer disks and tapes, and all copies thereof.

6.4 Injunctive Relief; Tolling. Without intending to limit the remedies available to the Company, the Employee acknowledges that a breach of any of the covenants contained in this Section 6 will result in material and irreparable injury to the Company or its affiliates or subsidiaries for which there is no adequate remedy at law, that it will not be possible to measure damages for such injuries precisely and that, in the event of such a breach or threat thereof, the Company shall be entitled to seek a temporary restraining order and/or a preliminary or permanent injunction restraining the Employee from engaging in activities prohibited by this Section 6 or such other relief as may be required specifically to enforce any of the covenants in this Section 6. If for any reason, it is held that the restrictions under this Section 6 are not reasonable or that consideration therefore is inadequate, such restrictions shall be interpreted or modified to include as much of the duration and scope identified in this Section 6 as will render such restrictions valid and enforceable including, if applicable, modifications to the geographic scope of Section 6.2.3. The Post-Termination Restrictive Covenant Period will not include any period during which the Employee is in violation of Sections 6.1, 6.2.1, 6.2.2 or 6.2.3.

6.5 Communication to Third Parties. The Employee agrees that the Company shall have the right to communicate the terms of this Section 6 to any third parties, including but not limited to, any prospective employer of the Employee. The Employee waives any right to assert any claim for damages against Company or any officer, employee or agent of Company arising from such disclosure of the terms of this Section 6.

6.6 Independent Obligations. The provisions of this Section 6 shall be independent of any other provision of this Agreement. The existence of any claim or cause of action by the Employee against the Company, whether predicated on this Agreement or otherwise, shall not constitute a defense of the enforcement of this Section 6 by the Company.

6.7 Non-Exclusivity. The Company's rights and the Employee's obligations set forth in this Section 6 and in Section 7 are in addition to, and not in lieu of, all rights and obligations provided by applicable statutory or common law.

7. INVENTIONS

The term "Invention" means any discovery, concept or idea, whether or not patentable or copyrightable, including but not limited to processes, methods, formulae and techniques, as well as improvements thereof or know- how related thereto. The Employee will promptly and fully inform the Company in writing of any Invention which is conceived, made, or reduced to practice by the Employee, either solely or jointly with another or others, during the Employment Term or within 12 months after termination of the Employee's employment for any reason, setting forth in detail the procedures employed and the results achieved. The Company and/or its nominee or assign will be the sole owner, without payment of royalty or any other compensation to the Employee, of any such Invention which (i) is conceived, made or reduced to practice with the use of Confidential Information or the Company's equipment, facilities, materials, personnel or other resources, or (ii) at the time it is conceived, made or reduced to practice relates to the Company's present or prospective business or actual or demonstrably anticipated research or development, or (iii) is the result of any work performed by the Employee for the Company. With respect to each such Invention of which the Company is the owner, the Employee will execute and deliver promptly to the Company (without charge to the Company but at its expense) such written instruments and do such other acts as may be necessary in the opinion of the Company to obtain and maintain United States and/or foreign letters patent or United States and/or foreign copyright registrations and to vest the entire right and title thereto in the Company.

8. TAX MATTERS.

8.1 Section 409A. Although the Company does not guarantee the tax treatment of any payments or benefits under this Agreement, the intent of the parties is that the payments and benefits under this Agreement be exempt from or, to the extent not exempt, comply with, Section 409A of the of the Internal Revenue Code of 1986, as amended (the "Code"), and the regulations and guidance promulgated thereunder (collectively "Section 409A"), and, accordingly, to the maximum extent possible, this Agreement will be interpreted and construed consistent with such intent. Notwithstanding any other provision of this Agreement to the contrary, if, at the time of Employee's separation from service, the Employee is a "specified employee" within the meaning and in accordance with Treasury Regulation Section 1.409A-1(i), then the Company will defer the payment or commencement of any "deferred compensation" subject to Section 409A that is payable upon separation from service (without any reduction in such payments or benefits ultimately paid or provided to Employee) until the date that is six (6) months following separation from service or, if earlier, the earliest other date as is permitted under Section 409A (and any amounts that otherwise would have been paid during this deferral period will be paid in a lump sum on the day after the expiration of the six (6) month period or such shorter period, if applicable). Notwithstanding the foregoing, the Company does not guarantee any particular tax result, and in no event whatsoever will the Company, its affiliates, or their respective officers, directors, employees, counsel or other service

providers, be liable for any tax, interest or penalty that may be imposed on Employee by Section 409A or damages for failing to comply with Section 409A.

8.2 Section 280G. In the event that any payments and other benefits provided for in this Agreement or otherwise payable to the Employee constitute "parachute payments" within the meaning of Section 280G of the Code, and, but for this paragraph, would be subject to the excise tax imposed by Section 4999 of the Code, then any such payments and benefits will be either (1) delivered in full or (2) delivered as to such lesser extent which would result in no portion of such payments and benefits being subject to excise tax under Section 4999 of the Code, whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the excise tax imposed by Section 4999 of the Code, results in the receipt by the Employee, on an after-tax basis, of the greatest amount of payments and benefits, notwithstanding that all or some portion of such benefits may be taxable under Section 4999 of the Code. If a reduction in the Employee's payments and benefits is necessitated by the preceding sentence, such reduction will occur in the following order: (i) any cash amounts payable to the Employee, (ii) benefits valued as parachute payments, and (iii) acceleration of vesting of any equity awards. Any determination required under this paragraph will be made in writing by the Company's independent public accountants (the "Firm"), whose determination will be conclusive and binding upon the Employee and the Company. For purposes of making the calculations required by this paragraph, the Firm may make reasonable assumptions and approximations concerning applicable taxes and may rely on reasonable, good faith interpretations concerning the application of Sections 280G and 4999 of the Code. The Company and the Employee will furnish to the Firm such information and documents as the Firm may reasonably request in order to make a determination under this paragraph. The Company will bear all costs the Firm may incur in connection with any calculations contemplated by this paragraph

9. CLAWBACK.

To the maximum extent permitted by applicable law, all amounts paid or provided to Employee hereunder shall be subject to any clawback or recoupment policy that may be maintained by the Company from time to time, and the requirements of any law or regulation applicable to the Company and governing the clawback or recoupment of executive compensation, or as set forth in any final non-appealable order by any court of competent jurisdiction or arbitrator.

10. MISCELLANEOUS.

10.1 Notices. All notices or communications hereunder shall be in writing, addressed as follows:

To the Company,

22nd Century Group, Inc.
500 Seneca Street
Suite 507, Buffalo, NY14204
Attention: Chairman of the Board

To the Employee,

at such address maintained in the Company's records as the Employee's primary residential address.

All such notices shall be conclusively deemed to be received and shall be effective, (i) if sent by hand delivery, upon receipt, (ii) if sent by nationally recognized overnight carrier, upon receipt; or (iii) if sent by registered or certified mail, on the fifth day after the day on which such notice is mailed.

10.2 Severability. Each provision of this Agreement shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be prohibited by or invalid under applicable law, such provision will be ineffective only to the extent of such prohibition or invalidity, without invalidating the remainder of such provision or the remaining provisions of this Agreement.

10.3 Assignment. Neither this Agreement nor any rights hereunder shall be assignable or otherwise subject to hypothecation by the Employee. The Company may assign this Agreement to any successor to all or substantially all of the business and/or assets of the Company. As used in this Agreement, "Company" will mean the Company and any successor to

its business and/or assets which assumes and agrees to perform the duties and obligations of the Company under this Agreement by operation of law or otherwise.

10.4 Entire Agreement. This Agreement represents the entire agreement of the parties and shall supersede any and all previous contracts, arrangements or understandings between the Company and the Employee relating to the subject matter hereof, including, without limitation, the Consulting Agreement, but not including the Equity Documents or any other documents governing any equity awards to the Employee. This Agreement may be amended at any time by mutual written agreement of the parties hereto.

10.5 Withholding. The payment of any amount pursuant to this Agreement shall be subject to applicable withholding and payroll taxes, and such other deductions as may be required under the applicable law or Company's employee benefits plans, if any.

10.6 Governing Law; Jurisdiction. This Agreement shall be governed by, and construed in accordance with, the laws of the State of New York applicable to contracts executed in and to be performed entirely within that state. The Company and the Employee agree that any suit, action or proceeding seeking to enforce any provision of, or based on any matter arising out of or in connection with, this Agreement or the Employee's employment with the Company will be brought only to the exclusive jurisdiction of the courts of the State of New York or the federal courts located in the State of New York, in each case located in Buffalo, New York, and each of the Company and the Employee hereby consents to the jurisdiction of such courts (and of the appropriate appellate courts therefrom) in any such suit, action or proceeding and irrevocably waives, to the fullest extent permitted by law, any objection which it may now or hereafter have to the laying of the venue of any such suit, action or proceeding in any such court or that any such suit, action or proceeding which is brought in any such court has been brought in an inconvenient forum. Further, the Company and the Employee agree that, after a legal dispute is before a court as specified in this Section 10.6, and during the pendency of such dispute before such court, all actions, suits, or proceedings with respect to such dispute or any other dispute, including without limitation, any counterclaim, cross-claim or interpleader, will be subject to the exclusive jurisdiction of such court.

10.7 Costs of Enforcement. In the event of a dispute or action to enforce the terms of this Agreement, the prevailing party shall be entitled to its costs and expenses incurred in connection therewith, including all attorneys' fees.

10.8 Legal Advice. The Employee hereby represents and warrants to the Company that he has had the opportunity to seek independent legal advice prior to the execution and delivery of this Agreement and that he has availed himself of that opportunity prior to signing this Agreement and that he is signing this Agreement voluntarily without any undue pressure. Employee represents that he: (i) is familiar with the covenants set forth in Section 6 and

(ii) is fully aware of his obligations hereunder, including, without limitation, the reasonableness of the length of time, scope and geographic coverage of such covenants.

10.9 Absence of Conflicting Obligations; Absence and Waiver of Prior Clams. The Employee represents and warrants that his execution, and delivery of this Agreement, and his performance of services for the Company as contemplated by this Agreement, do not conflict with or breach any contractual, fiduciary or other legal obligation owed by the Employee to any other individual or entity. The Employee further (a) represents and warrants that neither the Employee nor any of the Employee's affiliates has, or is aware of any basis for, any claim or cause of action of any kind whatsoever (including, without limitation, any claim based on misclassification), existing as of the Effective Date, against the Company, its subsidiaries, divisions or affiliates, or their respective predecessors, successors, assigns, directors or officers (collectively, the "**Company Parties**"), and (b) to the greatest extent permitted by applicable law, hereby fully and forever releases and discharges the Company Parties from any such claims arising or existing as of or prior to the Effective Date.

10.10 Counterparts. This Agreement may be executed in multiple counterparts (including by means of electronic signatures, or facsimile or PDF signature pages), any one of which need not contain the signatures of more than one party, but all such counterparts taken together will constitute one and the same instrument.

10.11 Survival. Sections 2.4 and 5 through 10 hereof will survive and continue in full force and effect in accordance with their respective terms notwithstanding any termination of the Employment Term and/or this Agreement.

[Signature page follows]

IN WITNESS WHEREOF, the Company has caused this Agreement to be duly executed and the Employee has hereunto set his hand, as of the day and year first above written.

22nd CENTURY GROUP, INC.

By: /s/ John Miller
Name: John J. Miller
Title: President, Tobacco Division

John Miller

EXHIBIT A

22nd CENTURY GROUP, INC.
TERMINATION AGREEMENT AND RELEASE

In consideration of the payments and benefits to be provided to me by 22nd Century Group, Inc. (the "**Company**") pursuant to Section 5.2.1 of the Employment Agreement between the Company and me dated November 11, 2022 (the "**Employment Agreement**"), I agree as follows:

1. Termination. My employment with the Company is terminated effective ____ and I will not thereafter apply for employment with the Company.

2. Release. On behalf of myself and my heirs, successors, executors, administrators, trustees, legal representatives, agents and assigns, I fully and forever release and discharge the Company, its subsidiaries, divisions and affiliates and its and all of their predecessors, successors, assigns, directors and officers (collectively "**Released Parties**") from any and all claims, demands, suits, causes of action, obligations, promises, damages, fees, covenants, agreements, attorneys' fees, debts, contracts and torts of every kind whatsoever, known or unknown, at law or in equity, foreseen or unforeseen, which against the Released Parties I ever had, now have or which I may have for, upon or by reason of any matter, cause or thing whatsoever relating to or arising from my employment with the Company or the termination thereof, specifically including, but not limited to, all claims under the following: the Civil Rights Acts of 1866, 1871, 1964 and 1991; the Age Discrimination in Employment Act of 1967; the Older Workers' Benefit Protection Act of 1990; the Americans with Disabilities Act; the Equal Pay Act; the Employee Retirement Income Security Act; the Worker Adjustment Retraining Notification Act; the Family and Medical Leave Act; the National Labor Relations Act; the Occupational Safety and Health Act; the New York State Human Rights Law; the New York City Human Rights Law; the New York State Labor Law; §§ 120 and 241 of the New York State Workers' Compensation Law; the Florida Civil Rights Act – Fla. Stat.
§ 760.01, et seq.; Florida's Private-Sector Whistle-blower's Act – Fla. Stat. § 112.3187, et seq.; Florida's Statutory Provision Regarding Retaliation/Discrimination for Filing a Worker's Compensation Claim – Fla. Stat. § 440.205; Florida's Statutory Provision Regarding Wage Rate Discrimination Based on Sex – Fla. Stat. § 448.08; The Florida Equal Pay Act – Fla. Stat. § 725.07; The Florida Omnibus AIDS Act – Fla. Stat. § 760.50; Florida's Statutory Provisions Regarding Employment Discrimination on the Basis of and Mandatory Screening or Testing for Sickle-Cell Trait – Fla. Stat. §§ 448.075, 448.076; Florida's Wage Payment Laws, Fla. Stat. §§ 448.01, 448.08; Florida's General Labor Regulations, Fla. Stat. ch. 448; any contract of employment, express or implied; and any and all other federal, state or local laws, rules or regulations.

I hereby waive the right to receive any personal relief (i.e. monetary or equitable relief) as a result of any lawsuit or other proceeding brought by the EEOC or any other governmental agency, based on or related to any of the matters from which I have released the Released Parties. I also will take all actions necessary, if any, now or in the future, to make this Release effective.

The foregoing release shall not operate to release the Company from its obligations to make payments and provide benefits as provided under Section 5.2.1 of the Employment Agreement.

In connection with the foregoing release (i) I acknowledge that the payments and benefits under Section 5.2.1 of the Employment Agreement are good and sufficient consideration to which I would not otherwise be entitled but for my execution and delivery to the Company of this instrument, (ii) I acknowledge that I have been advised by the Company to consult with an attorney before signing this instrument, (iii) the Company has allowed me at least twenty-one
(21) days from the date I first receive this instrument to consider it before being required to sign it and return it to the Company, and (iv) I may revoke this instrument, in its entirety, within seven
(7) days after signing it by delivering written notice of such revocation to the Company on or before 5:00 p.m. on the seventh day of such revocation period.

IN WITNESS WHEREOF, the undersigned has executed this instrument as of the 11 day of November, 2022.

Exhibit 10.17

22nd CENTURY GROUP, INC.
EMPLOYMENT AGREEMENT

This EMPLOYMENT AGREEMENT ("**Agreement**") is dated as of September 20, 2022 between 22nd CENTURY GROUP, INC., a Nevada corporation ("**Company**") and Peter Ferola ("**Employee**").

WHEREAS, the Company desires to engage the Employee as a full-time executive employee to provide services to the Company pursuant to the terms of this Agreement, and the Employee desires to accept such employment.

NOW, THEREFORE, in consideration of the covenants and agreements hereinafter set forth, the parties agree as follows:

1. EFFECTIVE DATE

The Employee's employment with the Company shall commence on October 3, 2022 (the "**Effective Date**").

2. EMPLOYMENT DUTIES AND TERM

2.1 General. As of the Effective Date, the Company employs the Employee as, and the Employee agrees to serve as, General Counsel and Corporate Secretary of the Company upon the terms and conditions specified in this Agreement. The Employee shall perform such duties and services for the Company as may be determined from time to time by the Company's Board of Directors (the "**Board**") and the Chief Executive Officer ("**CEO**") provided that such duties and services shall be consistent in all material respects with the
Employee's position Vice President, General Counsel and Corporate Secretary of the Company. Unless otherwise determined by the Board, the Employee will be a direct report to the CEO. The Employee agrees to serve the Company faithfully and to the best of his ability under the direction of the Board.

2.2 Exclusive Services. The Employee shall devote his full working time throughout the Employment Term (as defined in Section 2.3) to the performance of services for the Company. During the Employment Term, the Employee will not be employed by any other person or entity, or be self-employed, without the prior approval of the Board. The Employee shall use his best efforts, judgment and energy to improve and advance the business and interests of the Company in a manner consistent with the duties of his position. Upon the Employee's execution of this Agreement and during the Employment Term, the Employee will disclose to the Company any existing or proposed participation or membership in trade or professional associations, and any existing or proposed appointments as a member of the board of directors (or similar governing body) of any for-profit or not-for-profit entity; all such participations, memberships and appointments shall be subject to approval by the CEO.

2.3 Employment Term. The Employee's employment under this Agreement shall commence as of the Effective Date and shall continue until the earlier of (1) the 3-year anniversary of the Effective Date or (2) termination pursuant to Section 5 of this Agreement. This Agreement shall automatically renew for additional 1-year terms following the expiration of the initial 3-year term unless notice of non-renewal is given, by either party, at least 90 days' prior to the commencement of the next applicable 1-year renewal period. For the purposes of this Agreement, "**Employment Term**" means the period beginning on the Effective Date and ending on the date that Employee's employment with the Company terminates for any reason.

3. COMPENSATION

3.1 Base Salary. During the Employment Term, the Employee shall be paid an annual base salary ("**Base Salary**") in the amount of $325,000.00, payable in accordance with the Company's payroll practices. Base Salary is subject to increase, from time to time, in the sole and absolute discretion of the Board.

3.2 Signing Bonus. Within fifteen (15) days of the execution of this Agreement, Company shall pay to Employee a one-time cash payment of $30,000.00 ("**Signing Bonus**"). The Signing Bonus shall be subject to full repayment by Employee for a period of sixty (60) days from October 3, 2022 ("**Clawback Period**"), should Employee (i) resign from his employment with the Company during the Clawback Period or (ii) be terminated for Cause, as defined in Section 5.4 herein during the Clawback Period. For the avoidance of doubt, the Employee shall not be subject to any repayment obligations for the Signing Bonus after the expiration of the Clawback Period.

3.3 Cash Bonus Opportunity. During the Employment Term, the Employee will be eligible to earn an annual cash bonus targeted at 75% of Base Salary. The amount of cash bonus awarded to the Employee in any year will be determined by the Board, in consultation with the CEO, based on annual performance metrics and strategic goals for the Company and annual individual objectives for the Employee. Payment of a cash bonus in respect of a Company fiscal year will be made not later than 120 days following the end of the applicable Company fiscal year, provided that, if the Employment Term ends prior to payment, the Employee shall not be entitled to such cash award. Employee shall be eligible for a prorated cash bonus for 2022.

3.4 Performance Unit Awards. During the Employment Term, the Employee will be eligible to receive an annual award of Performance Units (as defined in the 2021 Plan). The target annual Performance Unit award to the Employee will be 100% of Base Salary, and each such award shall be subject to performance,vesting and other requirements specified by, or determined in accordance with, the 2021 Plan. Employee shall be eligible for a prorated RSU award (as defined in the Plan) for 2022.

3.5 Reimbursement of Expenses. The Company shall reimburse the Employee for reasonable travel and other business expenses incurred by him in the fulfillment of his duties hereunder upon presentation by the Employee of an itemized account of such expenditures, in accordance with Company practices and policies.

4. EMPLOYEE BENEFITS

The Employee shall, during the Employment Term, be included to the extent eligible thereunder in all employee benefit plans, programs or arrangements (including plans, programs or arrangements providing for retirement benefits, disability benefits, health and life insurance, or vacation and paid holidays) which shall from time to time be established by the Company for, or made available to, its management employees generally.

5. TERMINATION OF EMPLOYMENT

5.1 Termination Events.

5.1.1. By the Company. The Company may terminate the Employee's employment at any time for Cause (as hereinafter defined), without Cause, or upon the Employee's Disability (as hereinafter defined).

5.2 Termination Without Cause.

5.2.1 Severance Benefits. If the Employee's employment is terminated by the Company without Cause:

(i) The Company shall continue to pay the Employee the Base Salary (at the rate in effect immediately prior to such termination) for a period of 12 months following the effective date of termination (such period being referred to hereinafter as the "**Severance Period**"). The payments shall occur in installments in the same amount in effect immediately prior to such termination and at the same regular payment intervals as the Employee's Base Salary was being paid on the Effective Date and such installments shall be deemed a series of separate payments within the meaning of Treas. Reg. §1.409A-2(b)(2)(iii).

(ii) If the Employee timely elects continue health insurance coverage under the Company's applicable group health insurance plan pursuant to the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended ("COBRA"), then the Company shall directly pay, or reimburse Employee for, the COBRA premium for the Employee and Employee's covered dependents under such plan during the Severance Period, provided that (a) the Employee will be responsible for paying the same portion of the premium that the Company requires to be paid by its management employees under the applicable plan, and (b) the Company's obligation to pay or reimburse the Employee for such premiums will terminate on the date Employee becomes eligible to receive reasonably comparable health insurance coverage from a subsequent employer (and Employee agrees to promptly notify the Company of such eligibility). If the Company determines that it cannot provide the benefit

required by this Section 5.2.1(ii) without potentially breaching the Company's applicable group health insurance contract, violating applicable law (including, without limitation, Section 2716 of the Public Health Service Act) or incurring an excise tax, the Company shall in lieu thereof during the Severance Period pay to the Employee a taxable monthly payment in an amount equal to the portion of the COBRA premium otherwise payable or reimbursable by the Company under this Section 5.2.1(ii).

(iii) The Employee shall have no further right to receive any other compensation or benefits after such termination of employment except as specifically determined in accordance with the terms of the employee benefit plans or programs of the Company. In the event of the Employee's death during the Severance Period, Base Salary continuation payments under this Section 5.2.1 shall continue to be made during the remainder of the Severance Period to the beneficiary designated in writing for this purpose by the Employee or, if no such beneficiary is specifically designated, to the Employee's estate.

5.2.2 Termination of Severance Benefit. If, during the Severance Period, the Employee breaches any of his obligations under this Agreement (including, without limitation, the Employee's obligations under Section 6), the Company may, in addition to all other rights and remedies upon written notice to the Employee, terminate the Severance Period and cease to make any further payments or provide any benefits described in Section 5.2.1.

5.2.3 Release. The Company's obligation to make the Base Salary and provide health insurance benefits described in Section 5.2.1 shall be subject to the following conditions: (i) within 21 days after the effective date of termination or resignation, the Employee shall have executed and delivered to the Company a Termination Agreement and Release ("**Release**") in the form of Exhibit A attached hereto, and (ii) the Release shall not have been revoked by the Employee during the revocation period specified therein. If the Employee fails to deliver a fully executed Release to the Company before expiration of such 21 day period, or such release is revoked as permitted therein, then the Company will have no obligation to make any of the payments or provide any of the benefits specified in Section 5.2.1.

5.3 Termination for Cause; Resignation. If the Employee's employment is terminated by the Company for Cause, or the Employee resigns from his employment hereunder for any reason, the Employee shall be entitled only to payment of his Base Salary as then in effect through and including the date of termination or resignation. The Employee shall have no further right to receive any other compensation or benefits after such termination or resignation of employment, except as determined in accordance with the terms of the employee benefit plans or programs of the Company.

5.4 Cause. Termination for "**Cause**" shall mean termination of the Employee's employment by the Company because of:

(i) any willful act or omission that constitutes a material breach by the Employee of any of his obligations under this Agreement or any material written Company policy or procedure and failure to cure such breach after notice of, and a reasonable opportunity to cure, such breach;

(ii) the continued willful failure or refusal of the Employee to substantially perform the duties reasonably required of him as an employee of the Company;

(iii) an act of moral turpitude, dishonesty or fraud by, or criminal conviction (excluding non-felony convictions relating solely to vehicle and traffic offenses) of, the Employee which in the reasonable determination of the Board would render his continued employment by the Company damaging or detrimental to the Company;

(iv) any material misappropriation of Company property by the Employee; or

(v) any other willful misconduct by the Employee which is materially injurious to the financial condition or business reputation of, or is otherwise materially injurious to, the Company.

5.5 Termination by the Employee For Good Reason.

(i) This Agreement may be terminated by the Employee upon notice to the Company of any event constituting "Good Reason" as defined herein.

(ii) As used herein, the term "**Good Reason**" means: the failure of the Company to pay Employee's compensation in accordance with this Agreement without the prior written consent of the Employee; a material reduction in the Employee's Base Salary; a material reduction in the Employee's bonus opportunity; any material breach by the Company of any material provision of this Agreement or any material provision of any other agreement between the Employee and the Company; or a material, adverse change in the Employee's title, authority, duties, or responsibilities (other than temporarily while the Employee is physically or mentally incapacitated or as required by applicable law). Provided, however, that the Employee shall not be deemed to have Good Reason pursuant to this provision unless the Employee gives the Company written notice that the specified conduct or event has occurred and making specific reference to this Section 5.5 and the Company fails to cure such conduct or event within thirty (30) days of receipt of such notice.

(iii) In the event the Employee terminates this Agreement under this Section 5.5, Employee shall be entitled to the severance benefits described under Section 5.2, pertaining to Severance Benefits, provided that the Employee elects to comply with the Restrictive Covenants set forth in Section 6. If Employee disavows the Restrictive Covenants and chooses to compete with the Company in violation of the covenants set forth in Section 6, then Employee forfeits all Severance Benefits provided in Section 5.2.

5.6 Death or Disability**.** In the event of termination of employment by reason of death or Disability, the Employee (or his estate, as applicable) shall be entitled to Base Salary and

benefits through the date of termination. Other benefits shall be determined in accordance with the benefit plans maintained by the Company, and the Company shall have no further obligation hereunder. For purposes of this Agreement, "**Disability**" means a physical or mental disability or infirmity of the Employee that, in the sole opinion of the Board, prevents (with or without reasonable accommodation) the normal performance of substantially all his material duties as an employee of the Company, which disability or infirmity shall exist for any continuous period of 90 days.

5.7 Resignation of Positions. Upon termination of Employee's employment with the Company for any reason, the Employee agrees to immediately resign from all positions and offices in which he is then serving the Company and its subsidiaries.

6. CONFIDENTIALITY; NONSOLICITATION AND NONCOMPETITION

6.1 Confidentiality. The Employee covenants and agrees with the Company that he will not any time during the Employment Term and thereafter, except in performance of his obligations to the Company hereunder or with the prior written consent of the Company, directly or indirectly, disclose any secret or Confidential Information that he may learn or has learned by reason of his association with the Company. The term "**Confidential Information**" includes information not previously made generally available to the public by the Company, with respect to the Company's products, facilities, applications and methods, trade secrets and other intellectual property, systems, procedures, manuals, confidential reports, product price lists, customer lists, technical information, financial information (including the revenues, costs or profits associated with any of the Company's products), business and strategic plans, prospects or opportunities, but shall exclude any information which the Company intentionally makes generally available to the public other than as a result of disclosure by the Employee in violation of this Section 6.1. The Employee will be released of his obligations under this Section 6.1 to the extent the Employee is required to disclose under any applicable laws, regulations or directives of any government agency, tribunal or authority having jurisdiction in the matter or under subpoena or other process of law provided that the Employee provides the Company with prompt written notice of such requirement. In addition, the Employee will not be in breach of any obligations under Section 6.1, and will not be criminally or civilly liable under any Federal or state trade secret law, for the disclosure of Confidential Information that is made in confidence to a Federal, state or local government official, either directly or indirectly, or to an attorney, solely for the purpose of reporting or investigating a suspected violation of law involving the Company or is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. If the Employee files a lawsuit for retaliation by the Company for reporting a suspected violation of law involving the Company, the Employee may disclose Confidential Information, including trade secrets, to his attorney and use such Confidential Information in the court proceeding if such Confidential Information is filed under seal.

6.2 Acknowledgment of Company Assets. The Employee acknowledges that the Company, at the Company's expense, has acquired, created and maintains, and will continue to acquire, create and maintain, significant goodwill with its current and prospective customers,

strategic partners, vendors and employees and significant Confidential Information, and that such goodwill and Confidential Information is valuable property of the Company. The Employee further acknowledges that to the extent such goodwill and Confidential Information will be generated through the Employee's efforts, such efforts will be funded by the Company and the Employee will be fairly compensated for such efforts. The Employee acknowledges that all goodwill developed by the Employee relative to the Company's customers, strategic partners, vendors and employees, and all Confidential Information developed by the Employee, shall be the sole and exclusive property of the Company and shall not be personal to the Employee. Accordingly, in order to afford the Company reasonable protection of such goodwill and of the Company's Confidential Information, the Employee agrees as follows:

6.2.1. No solicitation; Non-Interference. During the Employment Term and for a period of two years after termination of employment for any reason (such two-year period, the "**Post-Termination Restrictive Covenant Period**"), the Employee shall not, directly or indirectly, as an investor, lender, officer, director, manager, or as an employee, associate, consultant or agent of any individual or entity, or in any other capacity: (i) solicit or endeavor to entice away from the Company any individual who is employed by the Company; (ii) solicit or endeavor to entice away from the Company any entity who is, or was within the then most recent 12-month period, a customer (or reasonably anticipated to become a customer) of the Company; (iii) interfere with the business relationship between the Company and any customer, strategic partner, supplier or vendor of the Company or attempt to persuade or encourage any customer, strategic partner, supplier or vendor of the Company to cease doing business with the Company or to engage in any activity competitive with the Company; or (iv) make or publish any disparaging remarks about the Company, its products, prospects or management.

6.2.2 Change of Control Activity. The Employee agrees that during the Post-Termination Restrictive Covenant Period, the Employee shall not, directly or indirectly, or in any individual or representative capacity, engage or otherwise participate in any Change of Control Activity with respect to the Company. "**Change of Control Activity**" means (a) effect, seek, offer or propose (whether publicly or otherwise) to effect, or cause or participate in, or in any way assist any other individual or entity to effect, seek, offer or propose (whether publicly or otherwise) to effect or participate in: (i) any acquisition of any securities (or beneficial ownership thereof) or all or substantially all of the assets of the Company, (ii) any tender or exchange offer, merger or other business combination involving the Company, (iii) any recapitalization, restructuring, liquidation, dissolution or other extraordinary transaction with respect to the Company, or (iv) any "solicitation" of "proxies" (as such terms are used in the proxy rules of the Securities and Exchange Commission) or consents to vote any voting securities of the Company; (b) form, join or in any way participate in a "group" (as defined under the Securities Exchange Act of 1934, as amended) with respect to the securities of the Company; (c) make any public announcement with respect to, or submit an unsolicited proposal for or offer of (with or without condition), any extraordinary transaction involving the Company or its securities or assets; or (d) enter into any discussions or arrangements with any third party with respect to any of the foregoing.

6.2.3. Non-Competition. During the Employment Term and during the Post-Termination Restrictive Covenant Period, the Employee shall not, directly or indirectly, as

an investor, lender, officer, director, manager, or as an employee, associate, consultant or agent of any individual or entity, or in any other capacity, (other than as an investor owning not more than a 1% interest in a publicly-traded entity), engage in the Restricted Business (as hereinafter defined) anywhere in the world other than on behalf of the Company. The Employee acknowledges and agrees that the Company conducts business throughout the world, that the
Company's legitimate and protectable business interests are throughout the world, and therefore this Section 6.2.3 is intended to prohibit competitive activities by the Employee throughout the world. "**Restricted Business**" means research and product development with respect to, the manufacture, distribution, marketing or sale of, or the licensing of intellectual property related to, tobacco products, hemp products, cannabis products, cannabinoids or other products made from or related to the tobacco plant or the cannabis plant, including but not limited to hemp, hemp/cannabis, industrial hemp, marijuana, marijuana/cannabis, *Cannabis sativa, Cannabis indica, and Cannabis ruderalis*. The non-competition provisions of this Section 6.2 shall not apply to Employee's practice of law.

6.3 Exclusive Property. The Employee confirms that all Confidential Information is and shall remain the exclusive property of the Company. All business records, and documents (whether in paper or electronic media) kept or made by Employee relating to the business of the Company shall be and remain the property of the Company. Upon termination of the Employee's employment with the Company for any reason, the Employee promptly deliver
to the Company all of the following that are in the Employee's possession or under his control:
(i) all computers, telecommunication devices and other tangible property of the Company and its affiliates, and
(ii) all documents and other materials, in whatever form, which include Confidential Information or which otherwise relate in whole or in part to the present or prospective business of the Company, including but not limited to, drawings, graphs, charts, specifications, notes, reports, memoranda, and computer disks and tapes, and all copies thereof.

6.4 Injunctive Relief; Tolling. Without intending to limit the remedies available to the Company, the Employee acknowledges that a breach of any of the covenants contained in this Section 6 may result in material and irreparable injury to the Company or its affiliates or subsidiaries for which there is no adequate remedy at law, that it will not be possible to measure damages for such injuries precisely and that, in the event of such a breach or threat thereof, the Company shall be entitled to seek a temporary restraining order and/or a preliminary or permanent injunction restraining the Employee from engaging in activities prohibited by this Section 6 or such other relief as may be required specifically to enforce any of the covenants in this Section 6. If for any reason, it is held that the restrictions under this Section 6 are not reasonable or that consideration therefore is inadequate, such restrictions shall be interpreted or modified to include as much of the duration and scope identified in this Section 6 as will render such restrictions valid and enforceable including, if applicable, modifications to the geographic scope of Section 6.2.3. The Post-Termination Restrictive Covenant Period will not include any period during which the Employee is in violation of Sections 6.1, 6.2.1, 6.2.2 or 6.2.3.

6.5 Communication to Third Parties. The Employee agrees that the Company shall have the right to communicate the terms of this Section 6 to any third parties, including but not limited to, any prospective employer of the Employee. The Employee waives any right to

assert any claim for damages against Company or any officer, employee or agent of Company arising from such disclosure of the terms of this Section 6.

6.6 Independent Obligations. The provisions of this Section 6 shall be independent of any other provision of this Agreement. The existence of any claim or cause of action by the Employee against the Company, whether predicated on this Agreement or otherwise, shall not constitute a defense of the enforcement of this Section 6 by the Company.

6.7 Non-Exclusivity. The Company's rights and the Employee's obligations set forth in this Section 6 and in Section 7 are in addition to, and not in lieu of, all rights and obligations provided by applicable statutory or common law.

7. INVENTIONS

The term "Invention" means any discovery, concept or idea, whether or not patentable or copyrightable, including but not limited to processes, methods, formulae and techniques, as well as improvements thereof or know- how related thereto. The Employee will promptly and fully inform the Company in writing of any Invention which is conceived, made, or reduced to practice by the Employee, either solely or jointly with another or others, during the Employment Term or within 12 months after termination of the Employee's employment for any reason, setting forth in detail the procedures employed and the results achieved. The Company and/or its nominee or assign will be the sole owner, without payment of royalty or any other compensation to the Employee, of any such Invention which (i) is conceived, made or reduced to practice with the use of Confidential Information or the Company's equipment, facilities, materials, personnel or other resources, or (ii) at the time it is conceived, made or reduced to practice relates to the Company's present or prospective business or actual or demonstrably anticipated research or development, or (iii) is the result of any work performed by the Employee for the Company. With respect to each such Invention of which the Company is the owner, the Employee will execute and deliver promptly to the Company (without charge to the Company but at its expense) such written instruments and do such other acts as may be necessary in the opinion of the Company to obtain and maintain United States and/or foreign letters patent or United States and/or foreign copyright registrations and to vest the entire right and title thereto in the Company.

8. CERTAIN PAYMENTS

Notwithstanding anything in this Agreement to the contrary, if any amounts due to the Employee under this Agreement and any other plan or program of the Company constitute a "parachute payment" (as defined in Section 280G(b)(2) of the Internal Revenue Code of 1986, as amended (the "**Code**")), then the aggregate of the amounts constituting the parachute payment shall be reduced to an amount that will equal three times his "base amount" (as defined in Section 280G(b)(3) of the Code) less $1.00. The determination to be made with respect to this Section 8 shall be made by an accounting firm jointly selected by the Company and the Employee and paid by the Company, and which may be the Company's independent auditors.

9. MISCELLANEOUS.

9.1 Notices. All notices or communications hereunder shall be in writing, addressed as follows:

To the Company,

22nd Century Group, Inc.
500 Seneca Street, Suite 507
Buffalo, New York 14204
Attention: Director, Human Resources

To the Employee, at such address maintained in the Company's records as the Employee's primary residential address.

All such notices shall be conclusively deemed to be received and shall be effective, (i) if sent by hand delivery, upon receipt, (ii) if sent by nationally recognized overnight carrier, upon receipt; or (iii) if sent by registered or certified mail, on the fifth day after the day on which such notice is mailed.

9.2 Severability. Each provision of this Agreement shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be prohibited by or invalid under applicable law, such provision will be ineffective only to the extent of such prohibition or invalidity, without invalidating the remainder of such provision or the remaining provisions of this Agreement.

9.3 Assignment. Neither this Agreement nor any rights hereunder shall be assignable or otherwise subject to hypothecation by the Employee.

9.4 Entire Agreement. This Agreement represents the entire agreement of the parties and shall supersede any and all previous contracts, arrangements or understandings between the Company and the Employee relating to the subject matter hereof. This Agreement may be amended at any time by mutual written agreement of the parties hereto.

9.5 Withholding. The payment of any amount pursuant to this Agreement shall be subject to applicable withholding and payroll taxes, and such other deductions as may be required under the applicable law or Company's employee benefits plans, if any.

9.6 Governing Law; Jurisdiction. This Agreement shall be governed by, and construed in accordance with, the laws of the State of New York applicable to contracts executed in and to be performed entirely within that state. The Company and the Employee agree that any suit, action or proceeding seeking to enforce any provision of, or based on any matter arising out of or in connection with, this Agreement or the Employee's employment with the Company will be brought only to the exclusive jurisdiction of the courts of the State of New York or the federal courts located in the State of New York, in each case located in Buffalo, New York, and each of the Company and the Employee hereby consents to the jurisdiction of such courts (and of the

appropriate appellate courts therefrom) in any such suit, action or proceeding and irrevocably waives, to the fullest extent permitted by law, any objection which it may now or hereafter have to the laying of the venue of any such suit, action or proceeding in any such court or that any such suit, action or proceeding which is brought in any such court has been brought in an inconvenient forum. Further, the Company and the Employee agree that, after a legal dispute is before a court as specified in this Section 9.6, and during the pendency of such dispute before such court, all actions, suits, or proceedings with respect to such dispute or any other dispute, including without limitation, any counterclaim, cross-claim or interpleader, will be subject to the exclusive jurisdiction of such court.

9.7 Costs of Enforcement. In the event of a dispute or action to enforce the terms of this Employment Agreement, the prevailing party shall be entitled to its costs and expenses incurred in connection therewith, including all attorneys' fees.

9.8 Legal Advice. The Employee hereby represents and warrants to the Company that he has had the opportunity to seek independent legal advice prior to the execution and delivery of this Agreement and that he has availed himself of that opportunity prior to signing this Agreement and that he is signing this Agreement voluntarily without any undue pressure. Employee represents that he: (i) is familiar with the covenants set forth in Section 6 and
(ii) is fully aware of his obligations hereunder, including, without limitation, the reasonableness of the length of time, scope and geographic coverage of such covenants.

9.9 Absence of Conflicting Obligations. The Employee represents and warrants that his execution, and delivery of this Agreement, and his performance of services for the Company as contemplated by this Agreement, do not conflict with or breach any contractual, fiduciary or other legal obligation owed by the Employee to any other individual or entity.

9.10 Counterparts. This Employment Agreement may be executed in multiple counterparts (including by means of electronic signatures, or facsimile or PDF signature pages), any one of which need not contain the signatures of more than one party, but all such counterparts taken together will constitute one and the same instrument.

[Signature page follows]

IN WITNESS WHEREOF, the Company has caused this Agreement to be duly executed and the Employee has hereunto set his hand, as of the day and year first above written.

22nd CENTURY GROUP, INC.

By /s/ James A. Mish
Name: James A. Mish
Title: Chief Executive Officer

By /s/ Peter Ferola
Peter Ferola

EXHIBIT A

22nd CENTURY GROUP, INC. TERMINATION AGREEMENT AND RELEASE

In consideration of the payments and benefits to be provided to me by 22nd Century Group, Inc. (the "**Company**") pursuant to Section 5.2.1 of the Employment Agreement between the Company and me dated September 19, 2022 (the "**Employment Agreement**"), I agree as follows:

1. Termination. My employment with the Company is terminated effective _____ and I will not thereafter apply for employment with the Company.

2. Release. On behalf of myself and my heirs, successors, executors, administrators, trustees, legal representatives, agents and assigns, I fully and forever release and discharge the Company, its subsidiaries, divisions and affiliates and its and all of their predecessors, successors, assigns, directors and officers (collectively "**Released Parties**") from any and all claims, demands, suits, causes of action, obligations, promises, damages, fees, covenants, agreements, attorneys' fees, debts, contracts and torts of every kind whatsoever, known or unknown, at law or in equity, foreseen or unforeseen, which against the Released Parties I ever had, now have or which I may have for, upon or by reason of any matter, cause or thing whatsoever relating to or arising from my employment with the Company or the termination thereof, specifically including, but not limited to, all claims under the following: the Civil Rights Acts of 1866, 1871, 1964 and 1991; the Age Discrimination in Employment Act of 1967; the Older Workers' Benefit Protection Act of 1990; the Americans with Disabilities Act; the Equal Pay Act; the Employee Retirement Income Security Act; the Worker Adjustment Retraining Notification Act; the Family and Medical Leave Act; the National Labor Relations Act; the Occupational Safety and Health Act; the New York State Human Rights Law; the New York City Human Rights Law; the New York State Labor Law; §§ 120 and 241 of the New York State Workers' Compensation Law; any contract of employment, express or implied; and any and all other federal, state or local laws, rules or regulations.

I hereby waive the right to receive any personal relief (i.e. monetary or equitable relief) as a result of any lawsuit or other proceeding brought by the EEOC or any other governmental agency, based on or related to any of the matters from which I have released the Released Parties. I also will take all actions necessary, if any, now or in the future, to make this Release effective.

The foregoing release shall not operate to release the Company from its obligations to make payments and provide benefits as provided under Section 5.2.1 of the Employment Agreement.

In connection with the foregoing release (i) I acknowledge that the payments and benefits under Section 5.2.1 of the Employment Agreement are good and sufficient consideration to which I would not otherwise be entitled but for my execution and delivery to the Company of this instrument, (ii) I acknowledge that I have been advised by the Company to consult with an attorney before signing this instrument, (iii) the Company has allowed me at least twenty-one

(21) days from the date I first receive this instrument to consider it before being required to sign it and return it to the Company, and (iv) I may revoke this instrument, in its entirety, within seven (7) days after signing it by delivering written notice of such revocation to the Company on or before 5:00 p.m. on the seventh day of such revocation period.

IN WITNESS WHEREOF, the undersigned has executed this instrument as of the _____ day of _____.

Exhibit 10.18
EXECUTION VERSION

SECURITIES PURCHASE AGREEMENT

THIS **SECURITIES PURCHASE AGREEMENT** (this "***Agreement***") is dated as of March 3, 2023, between 22nd Century Group, Inc., a Nevada corporation (the "***Company***"), and each purchaser identified on the signature pages hereto (each, including its successors and assigns, a "***Purchaser***" and collectively, the "***Purchasers***") and JGB Collateral, LLC, a Delaware limited liability company, as collateral agent for the Purchasers (the "***Agent***").

WHEREAS, subject to the terms and conditions set forth in this Agreement and pursuant to *Section 4(a)(2)* of the Securities Act, and *Rule 506* promulgated thereunder, the Company desires to issue and sell to each Purchaser, and each Purchaser, severally and not jointly, desires to purchase from the Company, securities of the Company as more fully described in this Agreement.

NOW, THEREFORE, IN CONSIDERATION of the mutual covenants contained in this Agreement, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the Company and each Purchaser agree as follows:

ARTICLE I.
DEFINITIONS

1.1 **Definitions**. In addition to the terms defined elsewhere in this Agreement: (a) capitalized terms that are not otherwise defined herein have the meanings given to such terms in the Debentures (as defined herein), and (b) the following terms have the meanings set forth in this ***Section 1.1***:

"***Account Control Agreement(s)***" means any agreement entered into by and among Agent, Company or any Subsidiary and a third -party bank or other institution (including a securities intermediary) in which Company or any Subsidiary maintains a deposit account or an account holding investment property and which grants Agent a perfected first priority security interest in the subject account or accounts.

"***Action***" shall have the meaning assigned to such term in ***Section 3.1(j)***.

"***Affiliate***" means any Person that, directly or indirectly through one or more intermediaries, controls or is controlled by or is under common control with a Person, as such terms are used in and construed under *Rule 405* under the Securities Act.

"***Agent***" shall have the meaning assigned to such term in the preamble hereof.

"***Agent Indemnitee***" shall have the meaning assigned to such term in ***Section 5.22(a)***.

"***Agreement***" shall have the meaning assigned to such term in the preamble hereof.

"***Board of Directors***" means the board of directors of the Company.

"***Business Day***" means any day except any Saturday, any Sunday, any day which is a federal legal holiday in the United States or any day on which banking institutions in the State of New York are authorized or required by law or other governmental action to close; provided, however, for clarification, commercial banks shall not be deemed to be authorized or required by law to remain closed due to "stay at home", "shelter-in-place", "non-essential employee" or any other similar orders or restrictions or the closure of any physical branch locations at the direction of any governmental authority so long as the electronic funds transfer systems (including for wire transfers) of commercial banks in the State of New York generally are open for use by customers on such day.

"***Closing***" means the closing of the purchase and sale of the Debentures pursuant to ***Section 2.1***.

"***Closing Date***" means the Trading Day on which all of the Transaction Documents have been executed and delivered by the applicable parties thereto, and all conditions precedent set forth in Section 2.3 have been satisfied or waived.

"***Collateral***" shall have the meaning assigned to such term in the Security Agreement.

"***Collateral Assignment***" means the Collateral Assignment of Deed of Trust, dated as of the date hereof, by and between the Company and the Agent with respect to the Deed of Trust securing the Pledged Indebtedness.

"***Commission***" means the Securities and Exchange Commission.

"***Common Stock***" means the common stock of the Company, par value $0.00001 per share, and any other class of securities into which such securities may hereafter be reclassified or changed.

"***Common Stock Equivalents***" shall have the meaning assigned to such term in the Debentures.

"***Company***" shall have the meaning assigned to such term in the preamble hereof.

"***Company Counsel***" shall have the meaning assigned to such term in the Debentures.

"***Debenture Shares***" shall have the meaning assigned to such term in the Debentures.

"***Debentures***" means the 7.00% Original Issue Discount Senior Secured Debentures due, subject to the terms therein, March 3, 2026, issued by the Company to the Purchasers hereunder, in the form of ***Exhibit A*** attached hereto.

"***Deed of Trust***" means the Deed of Trust, Fixture Filing and Security Agreement dated of even date herewith by and between the Company, as grantor, and the Agent, as

beneficiary, with respect to 224 acres of real property in Delta County, Colorado commonly known as Needle Rock Farms.

"***Disclosure Schedules***" means the Disclosure Schedules delivered by the Company concurrently with the execution and delivery of this Agreement.

"***Disqualification Event***" shall have the meaning assigned to such term in ***Section 3.1(x)***.

"***Domestic Subsidiary***" means any Subsidiary that is incorporated or organized under the laws of any state of the United States or the District of Columbia.

"***Evaluation Date***" shall have the meaning assigned to such term in ***Section 3.1(z)***.

"***Exchange Act***" means the Securities Exchange Act of 1934, as amended.

"***Foreign Subsidiary***" means a Subsidiary that is not a Domestic Subsidiary.

"***GAAP***" shall have the meaning assigned to such term in ***Section 3.1(h)***.

"***Governmental Authority***" shall have the meaning assigned to such term in the Debentures.

"***Haynes and Boone***" means Haynes and Boone, LLP, with offices located at 30 Rockefeller Plaza, 26th Floor, New York, NY 10112.

"***Indebtedness***" shall have the meaning assigned to such term in the Debentures.

"***Intellectual Property Rights***" shall have the meaning assigned to such term in ***Section 3.1(n)***.

"***Issuer Covered Person(s)***" shall have the meaning assigned to such term in ***Section 3.1(x)***.

"***Lien***" shall have the meaning assigned to such term in the Debentures.

"***Material Adverse Effect***" shall have the meaning assigned to such term in ***Section 3.1(b).***

"***Maximum Rate***" shall have the meaning assigned to such term in ***Section 5.16***.

"***Money Laundering Laws***" shall have the meaning assigned to such term in ***Section 3.1(w)***.

"***OFAC***" shall have the meaning assigned to such term in ***Section 3.1(w)***.

"***Perfection Certificate***" means the completed certificate entitled "Perfection Certificate" duly executed and delivered to the Agent prior to the Closing.

"***Permits***" means all permits, licenses, registrations, certificates, orders, approvals, authorizations, consents, waivers, franchises, variances and similar rights issued by or obtained from any Governmental Authority or any other Person.

"***Permitted Liens***" shall have the meaning assigned to such term in the Debentures.

"***Person***" means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

"***Pledged Indebtedness***" means that certain Promissory Note in the original principal amount of $4,300,000 made by Panacea Life Sciences, Inc. payable to the Company with a maturity date of June 30, 2026.

"***Principal Amount***" means, as to each Purchaser, the amounts set forth below such Purchaser's signature block on the signature pages hereto next to the heading "Principal Amount," which shall equal $21,052,632 in the aggregate.

"***Principal Market***" shall have the meaning assigned to such term in the Debentures.

"***Proceeding***" means an action, claim, suit, investigation or proceeding (including, without limitation, an informal investigation or partial proceeding, such as a deposition), whether commenced or threatened.

"***Public Information Failure***" shall have the meaning assigned to such term in ***Section 4.1(b)***.

"***Public Information Failure Payments***" shall have the meaning assigned to such term in ***Section 4.1(b)***.

"***Purchaser(s)***" shall have the meaning assigned to such term in the preambles hereof.

"***Purchaser Party***" shall have the meaning assigned to such term in ***Section 4.9***.

"***Registration Statement***" shall have the meaning assigned to such term in ***Section 4.12(a)***.

"***Required Approvals***" shall have the meaning assigned to such term in ***Section 3.1(e)***.

"***Rule 144***" means *Rule 144* promulgated by the Commission pursuant to the Securities Act, as such Rule may be amended from time to time, or any similar rule or regulation hereafter adopted by the Commission having substantially the same effect as such Rule.

"***SEC Reports***" shall have the meaning assigned to such term in ***Section 3.1(h)***.

"***Securities***" means the Debentures, the Debenture Shares, the Warrants and the Warrant Shares.

"***Securities Act***" means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

"***Security Agreement***" means that certain Security Agreement, dated as of the date hereof, among the Company, the Domestic Subsidiaries, the Purchasers and the Agent in the form of ***Exhibit C*** attached hereto.

"***Security Documents***" shall mean the Security Agreement, the Perfection Certificate, the Account Control Agreement(s), the Deed of Trust, the Subordination Agreement, Collateral Assignment, and any other documents and filings required thereunder in order to grant the Purchasers or the Agent a perfected first priority security interest in the assets of the Company and each Domestic Subsidiary as provided in the Security Agreement, including all UCC-1 filing receipts.

"***Subscription Amount***" means, as to each Purchaser, the aggregate amount to be paid for Debentures and Warrants purchased hereunder as specified below such Purchaser's name on the signature page of this Agreement and next to the heading "*Subscription Amount*" in immediately available funds. The aggregate "Subscription Amount" shall be $20,000,000.

"***Subsidiary***" shall have the meaning assigned to such term in the Debentures.

"***Subsidiary Guaranty***" means a guaranty executed by each Subsidiary in favor of Agent and each Purchaser in substantially the form of ***Exhibit D*** attached hereto. "***Subsidiary Guaranties***" means all such guaranties, collectively.

"***Subordination Agreement***" means the Subordination Agreement, dated as of the date hereof, by and between Agent, Omnia Ventures, Inc., ESI Holdings, LLC, a Nevada limited liability company, PTB Investment Holdings, LLC, a Nevada limited liability company, Evergreen State Holdings, LLC, an Oregon limited liability company, GV Farm Services, LLC, an Oregon limited liability company, Central Oregon Processing, LLC, an Oregon limited liability company, and GVB Medical, LLC, a Nevada limited liability company in the form attached hereto as ***Exhibit B***.

"***Trading Day***" means a day on which the Principal Market is open for trading.

"***Transaction Documents***" means this Agreement, the Debentures, the Warrants, the Security Documents, the Subsidiary Guaranties, and all exhibits and schedules thereto and hereto and any other documents or agreements executed in connection with the transactions contemplated hereunder.

"***VWAP***" shall have the meaning assigned to such term in the Debentures.

"***Warrants***" means the five-year warrants to purchase 5,000,000 shares of Common Stock (subject to adjustment for any stock split, stock dividend, reverse stock split or

similar event after the date hereof) at an exercise price per share equal to 150% of VWAP for the Trading Day immediately preceding the date of this Agreement.

"***Warrant Shares***" means the shares of Common Stock issuable upon exercise of the Warrants.

ARTICLE II.
PURCHASE AND SALE

2.1 **Closing**. On the Closing Date, upon the terms and subject to the conditions set forth herein, the Company agrees to sell, and the Purchasers, severally and not jointly, agree to purchase, an aggregate of $21,052,632 in principal amount of the Debentures and the Warrants. Each Purchaser shall deliver to the Company, via wire transfer of immediately available funds equal to such Purchaser's Subscription Amount as set forth on the signature page hereto executed by such Purchaser, and the Company shall deliver to each Purchaser its respective Debenture and Warrants, and the Company and each Purchaser shall deliver the other items set forth in ***Section 2.2*** deliverable at the Closing. Upon satisfaction of the covenants and conditions set forth in ***Section 2.2*** and ***Section 2.3***, the Closing shall occur at the offices of Haynes and Boone or such other location as the parties shall mutually agree.

2.2 **Deliveries**.

(a) On or prior to the Closing Date, the Company shall deliver or cause to be delivered to each Purchaser the following:

(i) this Agreement duly executed by the Company;

(ii) evidence of the Required Approvals;

(iii) a legal opinion of Company Counsel, in form and substance reasonably acceptable to such Purchaser;

(iv) an ink-original Debenture registered in the name of such Purchaser;

(v) an ink-original Warrant registered in the name of such Purchaser to purchase a number of Warrant Shares equal to the product of (x) 5,000,000 and (y) the quotient of the principal amount of the Debentures purchased by such Purchaser and the aggregate principal amount of all Debentures issued under this Agreement;

(vi) the Subsidiary Guaranty duly executed by each Subsidiary;

(vii) the Perfection Certificate duly executed by the Company;

(viii) the Security Agreement duly executed by the Company and each Domestic Subsidiary along with all of the other Security Documents duly executed by the applicable parties thereto;

(ix) the Deed of Trust duly executed by the Company;

(x) evidence reasonably satisfactory to the Agent that the Existing Company Note is subordinated in all respects to the Debentures and the security interests granted to Purchasers under the Security Documents;

(xi) the Subordination Agreement duly executed by the parties thereto (other than Agent); and

(xii) ink-originals of all promissory notes, instruments and other documents evidencing the Pledged Indebtedness duly endorsed by the Company or accompanied by a duly executed instrument of transfer or allonge in a form acceptable to the Agent.

(b) On or prior to the Closing Date, each Purchaser shall deliver or cause to be delivered to the Company the following:

(i) this Agreement duly executed by such Purchaser;

(ii) such Purchaser's Subscription Amount by wire transfer of immediately available funds to the account specified in writing by the Company;

(iii) the Security Agreement duly executed by such Purchaser and the Agent, along with all of the Security Documents to which the Purchaser and Agent are a party duly executed thereby; and

(iv) the Subordination Agreement duly executed by the Agent.

2.3 **Closing Conditions**.

(a) The obligations of the Company hereunder in connection with the Closing are subject to the following conditions being met:

(i) the accuracy in all material respects on the Closing Date of the representations and warranties of the Purchasers contained herein (unless as of a specific date therein, in which case they shall be accurate in all material respects as of such date or, to the extent representations or warranties are qualified by materiality, in all respects);

(ii) all obligations, covenants and agreements of each Purchaser required to be performed at or prior to the Closing Date shall have been performed; and

(iii) the delivery by each Purchaser of the items set forth in ***Section 2.2(b)***.

(b) The respective obligations of the Purchasers hereunder in connection with the Closing are subject to the following conditions being met:

(i) the accuracy in all material respects when made and on the Closing Date of the representations and warranties of the Company contained herein and any other Transaction Document (unless as of a specific date therein, in which case they shall be accurate in all material respects as of such date or, to the extent representations or warranties are qualified by materiality, in all respects);

(ii) all obligations, covenants and agreements of the Company required to be performed at or prior to the Closing Date shall have been performed;

(iii) the delivery by the Company of the items set forth in ***Section 2.2(a)***;

(iv) there shall have been no Material Adverse Effect with respect to the Company since the date hereof;

(v) the Company shall have delivered a certificate, executed on behalf of the Company by its Secretary, dated as of the Closing Date, certifying the resolutions adopted by the Board of Directors of the Company approving the transactions contemplated by this Agreement and the other Transaction Documents, certifying the current versions of the Company's certificate or articles of incorporation and bylaws and certifying as to the signatures and authority of Persons signing the Transaction Documents and related documents on behalf of the Company;

(vi) the Company shall have delivered a certificate, executed on behalf of the Company by its Chief Executive Officer or its Chief Financial Officer, dated as of the Closing Date, certifying to the fulfillment of the conditions specified in this ***Section 2.3(b)***;

(vii) a perfected first priority security interest in all of the assets of the Company and each Guarantor securing the Company's and each Guarantor's obligations under the Transaction Documents shall have been established and perfected in favor of the Purchasers; and

(viii) from the date hereof to the Closing Date, trading in the Common Stock shall not have been suspended or halted by the Principal Market or the Commission and, at any time prior to the Closing Date, trading in securities generally as reported by Bloomberg L.P. shall not have been suspended or limited, or minimum prices shall not have been established on securities whose trades are reported by such service, or on the Principal Market, nor shall a banking moratorium have been declared either by United States or New York State authorities nor shall there have occurred any material outbreak or escalation of hostilities or other national or international calamity of such magnitude in its effect on, or any material adverse change in, any financial market which, in each case, in the reasonable judgment of such Purchaser, makes it impracticable or inadvisable to purchase the Debentures at the Closing.

2.4 Conditions Subsequent. The Company will use its commercially reasonable efforts to deliver to the Agent, in form and substance satisfactory to the Agent, duly executed landlord

waivers and collateral access agreements for the locations set forth in Sections 6 and 7 of the Perfection Certificate within 90 days after the Closing Date.

ARTICLE III.
REPRESENTATIONS AND WARRANTIES

3.1 **Representations and Warranties of the Company**. Except as set in the Disclosure Schedules, which Disclosure Schedules shall be deemed a part hereof and shall qualify any representation or otherwise made herein to the extent of the disclosure contained in the corresponding section of the Disclosure Schedules or to the extent the relevance of such disclosure to such representations and warranties is reasonably apparent, the Company hereby makes the following representations and warranties to the Purchasers as of the date hereof and as of the Closing Date (unless as of a specific date therein, in which case they shall be accurate as of such date):

(a) **Subsidiaries**. All of the direct and indirect subsidiaries of the Company are set forth on ***Schedule 3.1(a)***. Except as set forth on ***Section 3.1(a)***, the Company owns, directly or indirectly, all of the capital stock or other equity interests of each Subsidiary free and clear of any Liens (other than Permitted Liens), options or warrants, and all of the issued and outstanding shares of capital stock of each Subsidiary are validly issued and are fully paid, non-assessable and free of preemptive and similar rights to subscribe for or purchase securities.

(b) **Organization and Qualification**. The Company and each of the Subsidiaries is an entity duly incorporated or otherwise organized, validly existing and in good standing under the laws of the jurisdiction of its incorporation or organization, with the requisite power and authority to own and use its properties and assets and to carry on its business as currently conducted. Neither the Company nor any Subsidiary is in violation nor default of any of the provisions of its respective certificate or articles of incorporation, bylaws or other organizational or charter documents. Each of the Company and the Subsidiaries is duly qualified to conduct business and is in good standing as a foreign corporation or other entity in each jurisdiction in which the nature of the business conducted or property owned by it makes such qualification necessary, except where the failure to be so qualified or in good standing, as the case may be, would not have or reasonably be expected to result in: (i) a material adverse effect on the legality, validity or enforceability of any Transaction Document, (ii) a material adverse effect on the results of operations, assets, business or financial condition of the Company and the Subsidiaries, taken as a whole, (iii) a material adverse effect on the Company's ability to perform or pay in any material respect on a timely basis its obligations under any Transaction Document, or (iv) a material adverse effect on the Collateral or the Agent's Liens on the Collateral or the priority of such Liens except to the extent resulting from any action or inaction of Agent or any Purchaser (any of (i), (ii), (iii), or (iv), a "***Material Adverse Effect***") and no Proceeding has been instituted in any such jurisdiction revoking, limiting or curtailing or seeking to revoke, limit or curtail such power and authority or qualification.

(c) **Authorization; Enforcement**. The Company has the requisite corporate power and authority to enter into and to consummate the transactions contemplated by this Agreement and each of the other Transaction Documents and otherwise to carry out its obligations hereunder and thereunder. The execution and delivery of this Agreement and each of the other Transaction

Documents by the Company and the consummation by it of the transactions contemplated hereby and thereby have been duly authorized by all necessary action on the part of the Company and no further action is required by the Company, the Board of Directors or the Company's stockholders in connection herewith or therewith other than in connection with the Required Approvals. This Agreement and each other Transaction Document to which it is a party has been (or upon delivery will have been) duly executed by the Company and, when delivered in accordance with the terms hereof and thereof, will constitute the valid and binding obligation of the Company enforceable against the Company in accordance with its terms, except: (i) as limited by general equitable principles and applicable bankruptcy, insolvency, reorganization, moratorium and other laws of general application affecting enforcement of creditors' rights generally, (ii) as limited by laws relating to the availability of specific performance, injunctive relief or other equitable remedies, and (iii) insofar as indemnification and contribution provisions may be limited by applicable law.

(d) **No Conflicts**. The execution, delivery and performance by the Company of this Agreement and the other Transaction Documents to which it is a party, the issuance and sale of the Securities and the consummation by it of the transactions contemplated hereby and thereby do not and will not: (i) conflict with or violate any provision of the Company's or any Subsidiary's certificate or articles of incorporation, bylaws or other organizational or charter documents, (ii) conflict with, or constitute a default (or an event that with notice or lapse of time or both would become a default) under, result in the creation of any Lien (other than Liens in favor of the Agent pursuant to the Transaction Documents) upon any of the properties or assets of the Company or any Subsidiary, or give to others any rights of termination, amendment, acceleration or cancellation (with or without notice, lapse of time or both) of, any agreement, credit facility, debt or other instrument (evidencing a Company or Subsidiary debt or otherwise) or other understanding to which the Company or any Subsidiary is a party or by which any property or asset of the Company or any Subsidiary is bound or affected, or (iii) subject to receipt of the Required Approvals, conflict with or result in a violation of any law, rule, regulation, order, judgment, injunction, decree or other restriction of any court or Governmental Authority to which the Company or a Subsidiary is subject (including federal and state securities laws and regulations), or by which any property or asset of the Company or a Subsidiary is bound or affected; except in the case of each of clauses (ii) and (iii), such as would not have or reasonably be expected to result in a Material Adverse Effect.

(e) **Filings, Consents and Approvals**. The Company is not required to obtain any consent, waiver, authorization or order of, give any notice to, or make any filing or registration with, any court or other foreign, federal, state, local or other Governmental Authority in connection with the execution, delivery and performance by the Company of the Transaction Documents, other than: (i) the notice and/or application(s) to the Principal Market for the issuance of the Warrant Shares and Debenture Shares, and (ii) filings required pursuant to ***Sections 4.6*** and ***4.13***; (iii) the filing of UCC-1 financing statements with the appropriate filing office (collectively, the "***Required Approvals***").

(f) **Issuance of the Securities; Registration**. The Securities are duly authorized and, when issued and, with respect to the Debentures, Warrants and Warrant Shares, paid for in accordance with the applicable Transaction Documents, will be duly and validly issued, fully paid and nonassessable, free and clear of all Liens imposed by the Company other than restrictions imposed on transfer provided for in the Transaction Documents or applicable securities laws. The

Debenture Shares, if and when issued in accordance with the terms of the Transaction Documents, will be validly issued, fully paid and nonassessable, free and clear of all Liens imposed by the Company other than restrictions on transfer provided for in the Transaction Documents or applicable securities laws. The Company has reserved from its duly authorized capital stock a number of shares of Common Stock sufficient for issuance of all of the Warrant Shares.

(g) **Capitalization**. The capitalization of the Company is as set forth on ***Schedule 3.1(g)***. The Company has not issued any capital stock since its most recently issued SEC Report, other than pursuant to the exercise of employee stock options under the Company's employee equity and/or incentive plans, the issuance of shares of Common Stock to employees or consultants pursuant to the Company's employee equity and/or incentive plans and pursuant to the conversion and/or exercise of Common Stock Equivalents outstanding as of the date of the most recently filed periodic report under the Exchange Act. No Person has any right of first refusal, preemptive right, right of participation, or any similar right to participate in the transactions contemplated by the Transaction Documents. Except as set forth on ***Schedule 3.1(g)*** or in any SEC Report, there are no outstanding options, warrants, scrip rights to subscribe to, calls or commitments of any character whatsoever relating to, or securities, rights or obligations convertible into or exercisable or exchangeable for, or giving any Person any right to subscribe for or acquire any shares of Common Stock, or contracts, commitments, understandings or arrangements by which the Company or any Subsidiary is or may become bound to issue additional shares of Common Stock or Common Stock Equivalents. Except as set forth on ***Schedule 3.1(g)*** or in any SEC Report or in the Transaction Documents, the issuance and sale of the Securities will not obligate the Company to issue shares of Common Stock or other securities to any Person (other than the Purchasers) and will not result in a right of any holder of Company securities to adjust the exercise, conversion, exchange or reset price under any of such securities. There are no outstanding securities or instruments of the Company or any Subsidiary that contain any redemption or similar provisions, and there are no contracts, commitments, understandings or arrangements by which the Company or any Subsidiary is or may become bound to redeem a security of the Company or such Subsidiary. Other than as disclosed in the Company's SEC Reports, the Company does not have any stock appreciation rights or "phantom stock" plans or agreements or any similar plan or agreement. All of the outstanding shares of capital stock of the Company are duly authorized, validly issued, fully paid and non-assessable, have been issued in compliance with all applicable foreign, federal and state securities laws, and none of such outstanding shares was issued in violation of any preemptive rights or similar rights to subscribe for or purchase securities. No further approval or authorization of any stockholder, the Board of Directors or others is required for the issuance and sale of the Securities. There are no stockholders' agreements, voting agreements or other similar agreements with respect to the Company's capital stock to which the Company is a party or, to the knowledge of the Company, between or among any of the Company's stockholders.

(h) **SEC Reports; Financial Statements**. The Company has filed all reports, schedules, forms, statements and other documents required to be filed by the Company under the Exchange Act, including pursuant to *Section 13(a)* or *Section 15(d)* thereof for the two (2) years prior to the date hereof (the foregoing materials, including the exhibits thereto and documents incorporated by reference therein, which were filed during the two (2) years prior to the date hereof, being collectively referred to herein as the "***SEC Reports***") on a timely basis or has received a valid extension of such time of filing and has filed any such SEC Reports prior to the

expiration of any such extension. As of their respective dates, the SEC Reports complied in all material respects with the requirements of the Exchange Act, as applicable, and none of the SEC Reports, when filed, contained any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The Company has never been an issuer subject to paragraph (i) of *Rule 144*. The Company expects to timely file its Annual Report on Form 10-K for the fiscal year ended December 31, 2022. The financial statements of the Company included in the SEC Reports comply in all material respects with applicable accounting requirements and the rules and regulations of the Commission with respect thereto as in effect at the time of filing. Such financial statements have been prepared in accordance with United States generally accepted accounting principles applied on a consistent basis during the periods involved ("***GAAP***"), except as may be otherwise specified in such financial statements or the notes thereto and except that unaudited financial statements may not contain all footnotes required by GAAP, and fairly present in all material respects the financial position of the Company and its consolidated Subsidiaries as of and for the dates thereof and the results of operations and cash flows for the periods then ended, subject, in the case of unaudited statements, to normal, immaterial, year-end audit adjustments.

(i) **Material Changes; Undisclosed Events, Liabilities or Developments**. Since the date of the latest audited financial statements included within the SEC Reports, except as specifically disclosed in a subsequent SEC Report filed prior to the date hereof: (i) there has been no event, occurrence or development that has had or that would reasonably be expected to result in a Material Adverse Effect, (ii) neither the Company nor any Subsidiary has incurred any liabilities (contingent or otherwise) other than (A) liabilities incurred in the ordinary course of business consistent with past practice, and (B) liabilities not required to be reflected in the Company's financial statements pursuant to GAAP or disclosed in filings made with the Commission, (iii) the Company has not altered its method of accounting, (iv) the Company has not declared or made any dividend or distribution of cash or other property to its stockholders or purchased, redeemed or made any agreements to purchase or redeem any shares of its capital stock, and (v) the Company has not issued any equity securities to any officer, director or Affiliate, except pursuant to existing Company equity and/or incentive plans. The Company does not have pending before the Commission any request for confidential treatment of information. Except for the issuance of the Securities contemplated by this Agreement or as set forth on ***Schedule 3.1(i)*** or ***Schedule 3.1(r)*** or in any SEC Report, no event, liability, fact, circumstance, occurrence or development has occurred or exists or is reasonably expected to occur or exist with respect to the Company or its Subsidiaries or their respective businesses, properties, operations, assets or financial condition, that would be required to be disclosed by the Company under applicable securities laws at the time this representation is made or deemed made that has not been publicly disclosed at least one (1) Trading Day prior to the date that this representation is made.

(j) ***Litigation***. Except as disclosed in ***Schedule 3.1(j)*** or in any SEC Report, there is no action, suit, inquiry, notice of violation, proceeding or investigation pending or, to the knowledge of the Company, threatened against or affecting the Company, any Subsidiary or any of their respective properties before or by any court, arbitrator, governmental or administrative agency or regulatory authority (federal, state, county, local or foreign) (collectively, an "***Action***") which (i) adversely affects or challenges the legality, validity or enforceability of any of the Transaction Documents or the Securities, or (ii) would, if there were an unfavorable decision, have

or reasonably be expected to result in a Material Adverse Effect. Except as disclosed in ***Schedule 3.1(j)*** or in any SEC Report, none of the Company, any Subsidiary, or any current director or officer thereof, is or has been the subject of any Action involving a claim of violation of or liability under federal or state securities laws or a claim of breach of fiduciary duty. There has not been, and to the knowledge of the Company, there is not pending or contemplated, any investigation by a Governmental Authority involving the Company or any current or former director or officer of the Company. The Commission has not issued any stop order or other order suspending the effectiveness of any registration statement filed by the Company or any Subsidiary under the Exchange Act or the Securities Act.

(k) **Compliance**. Except as set forth on ***Schedule 3.1(k)*** or in any SEC Report, neither the Company nor any Subsidiary, except in each case as would not have or reasonably be expected to result in a Material Adverse Effect: (i) is in default under or in violation of (and no event has occurred that has not been waived that, with notice or lapse of time or both, would result in a default by the Company or any Subsidiary under), nor has the Company or any Subsidiary, received, in the prior 2 years, notice of a claim that it is in default under or that it is in violation of, any indenture, loan or credit agreement or any other agreement or instrument to which it is a party or by which it or any of its properties is bound (whether or not such default or violation has been waived), (ii) is in violation of any judgment, decree or order of any court, arbitrator or other Governmental Authority applicable to it, or (iii) is or has been in violation of any statute, rule, ordinance or regulation of any Governmental Authority, including without limitation all applicable foreign, federal, state and local laws relating to taxes, bribery and corruption, occupational health and safety, product quality and safety and employment and labor matters and law related to the protection of the environment.

(l) **Regulatory Permits**. The Company and the Subsidiaries possess all Permits necessary to conduct their respective businesses, except where the failure to possess such Permits would not reasonably be expected to result in a Material Adverse Effect, and neither the Company nor any Subsidiary has received any notice of proceedings relating to the revocation or modification of any such Permit.

(m) **Title to Assets**. The Company and the Subsidiaries have good and marketable title in fee simple to all real property owned by them and good and marketable title in all personal property owned by them that is material to the business of the Company and the Subsidiaries, in each case free and clear of all Liens, except for (i) Permitted Liens; (ii) Liens as do not materially affect the value of such property and do not materially interfere with the use made and proposed to be made of such property by the Company and the Subsidiaries, and (iii) Liens for the payment of federal, state or other taxes, for which appropriate reserves have been made therefor in accordance with GAAP and, the payment of which is neither delinquent nor subject to penalties. Any real property and facilities held under lease by the Company and the Subsidiaries are held by them under valid, subsisting and enforceable leases with which the Company and the Subsidiaries are in compliance except where the invalidity, enforceability or noncompliance would not reasonably be expected to result in a Material Adverse Effect.

(n) **Intellectual Property**. To the knowledge of the Company, the Company and the Subsidiaries have, or have rights to use, all patents, patent applications, trademarks, trademark applications, service marks, trade names, trade secrets, inventions, copyrights, licenses and other

intellectual property rights and similar rights as described in the SEC Reports as necessary or required for use in connection with their respective businesses and which the failure to so have would not reasonably be expected to have a Material Adverse Effect (collectively, the "***Intellectual Property Rights***"). Except as disclosed on ***Schedule 3.1(n)***, none of, and neither the Company nor any Subsidiary has received a written notice that any of the Intellectual Property Rights owned by the Company or any of its Subsidiaries has expired, terminated or been abandoned, or is expected to expire or terminate or be abandoned, within 2 years from the date of this Agreement. Neither the Company nor any Subsidiary has received, since the date of the latest audited financial statements included within the SEC Reports, a written notice of a claim or otherwise has any knowledge that the Intellectual Property Rights violate or infringe upon the rights of any Person, except as would not have or reasonably be expected to have a Material Adverse Effect. To the knowledge of the Company, all such Intellectual Property Rights that have been registered with a Governmental Authority are enforceable and there is no existing infringement by another Person of any of such registered Intellectual Property Rights. The Company and its Subsidiaries have taken reasonable security measures to protect the secrecy, confidentiality and value of all of their Intellectual Property Rights, except where failure to do so would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(o) **Insurance**. The Company and the Subsidiaries are insured by insurers of recognized financial responsibility against such losses and risks and in such amounts as are prudent and customary in the businesses in which the Company and the Subsidiaries are engaged, including, but not limited to, directors and officers insurance coverage at least equal to the aggregate Subscription Amount. Neither the Company nor any Subsidiary has any reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage from similar insurers as may be necessary to continue its business without a significant increase in cost.

(p) **Certain Fees**. Except as set forth on ***Schedule 3.1(p)***, no brokerage or finder's fees or commissions are or will be payable by the Company or any Subsidiaries to any broker, financial advisor or consultant, finder, placement agent, investment banker, bank or other Person with respect to the transactions contemplated by the Transaction Documents. The Purchasers shall have no obligation with respect to any fees or with respect to any claims made by or on behalf of other Persons for fees owed by the Company or any Subsidiary of a type contemplated in this ***Section*** that may be due in connection with the transactions contemplated by the Transaction Documents.

(q) **Private Placement**. Assuming the accuracy of the Purchasers' representations and warranties set forth in ***Section 3.2***, no registration under the Securities Act is required for the offer and sale of the Securities by the Company to the Purchasers as contemplated hereby. The issuance and sale of the Securities hereunder does not contravene the rules and regulations of the Principal Market.

(r) **Disclosure**. Except with respect to the material terms and conditions of the transactions contemplated by the Transaction Documents and the matters set forth on ***Schedule 3.1(r)***, the Company confirms that neither it nor any other Person acting on its behalf has provided any of the Purchasers or their agents or counsel with any information that it believes constitutes or might constitute material, non-public information. The Company understands and confirms that the Purchasers will rely on the foregoing representation in effecting transactions in securities of

the Company. All of the disclosure furnished by or on behalf of the Company to the Purchasers regarding the Company and its Subsidiaries, their respective businesses and the transactions contemplated hereby, including the Disclosure Schedules, is true and correct in all material respects and does not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements made therein, in light of the circumstances under which they were made, not materially misleading. The press releases disseminated by the Company during the twelve (12) months preceding the date of this Agreement taken as a whole do not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary in order to make the statements therein, in light of the circumstances under which they were made and when made, not materially misleading. The Company acknowledges and agrees that no Purchaser makes or has made any representations or warranties with respect to the transactions contemplated hereby other than those specifically set forth in ***Section 3.2***.

(s) **Solvency; Seniority**. Based on the consolidated financial condition of the Company as of the Closing Date, after giving effect to the receipt by the Company of the proceeds from the sale of the Securities hereunder: (i) the fair saleable value of the Company's tangible assets exceeds the amount that will be required to be paid on or in respect of the Company's existing debts and other liabilities (including known contingent liabilities) as they mature, (ii) the Company's assets do not constitute unreasonably small capital to carry on its business as now conducted and as proposed to be conducted including its capital needs taking into account the particular capital requirements of the business conducted by the Company, consolidated and projected capital requirements and capital availability thereof, and (iii) the current cash flow of the Company, together with the proceeds the Company would receive, were it to liquidate all of its assets, after taking into account all anticipated uses of the cash, would be sufficient to pay all amounts on or in respect of its liabilities when such amounts are required to be paid. The Company does not intend to incur debts beyond its ability to pay such debts as they mature (taking into account the timing and amounts of cash to be payable on or in respect of its debt). The Company has no knowledge of any facts or circumstances which lead it to believe that it will file for reorganization or liquidation under the bankruptcy or reorganization laws of any jurisdiction within one year from the Closing Date. ***Schedule 3.1(s)*** sets forth as of the date hereof all outstanding secured and unsecured Indebtedness of the Company or any Subsidiary, or for which the Company or any Subsidiary has commitments. As of the Closing Date, (1) no Indebtedness or other claim against the Company is senior to the Debentures in right of payment, whether with respect to interest or upon liquidation or dissolution, or otherwise, and (2) no Indebtedness or other claim against any Subsidiary is senior to such Subsidiary's obligations under the Subsidiary Guaranty in right of payment, whether with respect to interest or upon liquidation or dissolution, or otherwise.

(t) **Tax Status**. Except for matters that would not, individually or in the aggregate, have or reasonably be expected to result in a Material Adverse Effect, the Company and its Subsidiaries each (i) has made or filed all United States federal, state and local income and all foreign income and franchise tax returns, reports and declarations required by any jurisdiction to which it is subject, (ii) has paid all taxes and other governmental assessments and charges that are material in amount, shown or determined to be due on such returns, reports and declarations, and (iii) has set aside on its books provision reasonably adequate for the payment of all material taxes for periods subsequent to the periods to which such returns, reports or declarations apply. There

are no unpaid taxes in any material amount claimed to be due by the taxing authority of any jurisdiction, and the officers of the Company or of any Subsidiary know of no basis for any such claim. The Company is not and has never been a United States real property holding corporation within the meaning of *Section 897* of the Internal Revenue Code of 1986, as amended, and the Company shall so certify upon Purchaser's reasonable request at any time.

(u) **Acknowledgment Regarding Purchasers' Purchase of Securities**. The Company acknowledges and agrees that each of the Purchasers is acting solely in the capacity of an arm's length purchaser with respect to the Transaction Documents and the transactions contemplated thereby. The Company further acknowledges that no Purchaser is acting as a financial advisor or fiduciary of the Company (or in any similar capacity) with respect to the Transaction Documents and the transactions contemplated thereby and any advice given by any Purchaser or any of their respective representatives or agents in connection with the Transaction Documents and the transactions contemplated thereby is merely incidental to the Purchasers' purchase of the Securities. The Company further represents to each Purchaser that the Company's decision to enter into this Agreement and the other Transaction Documents has been based solely on the independent evaluation of the transactions contemplated hereby by the Company and its representatives.

(v) **Acknowledgment Regarding Purchaser's Trading Activity**.

(i) Anything in this Agreement or elsewhere herein to the contrary notwithstanding except as set forth in Section 3.1(v)(ii), it is understood and acknowledged by the Company that: (A) none of the Purchasers has been asked by the Company to agree, nor has any Purchaser agreed, to desist from purchasing or selling, long and/or short, securities of the Company, or "derivative" securities based on securities issued by the Company or to hold the Securities for any specified term, (B) past or future open market or other transactions by any Purchaser may negatively impact the market price of the Company's publicly-traded securities, and (C) each Purchaser shall not be deemed to have any affiliation with or control over any arm's length counter-party in any "derivative" transaction. The Company further understands and acknowledges that (y) one or more Purchasers may engage in hedging activities at various times during the period after the Closing and while the Securities are outstanding, including, without limitation, during the periods that the value of the Debenture Shares deliverable with respect to Securities are being determined, and (z) such hedging activities (if any) could reduce the value of the existing stockholders' equity interests in the Company at and after the time that the hedging activities are being conducted. The Company acknowledges that such aforementioned hedging activities do not constitute a breach of any of the Transaction Documents.

(ii) Each Purchaser, severally and not jointly with the other Purchasers, (A) represents that neither it nor any Affiliates acting on its behalf or pursuant to any understanding with it presently has, or prior to Closing, will have a "short" position in the Common Stock and (B) covenants that neither it nor any Affiliates acting on its behalf or pursuant to any understanding with it will, directly or indirectly, and it will not request, encourage or incite any person to execute any short sales of any of the Company's securities during the period commencing with the execution of this Agreement and ending on the Closing Date.

(w) **Office of Foreign Assets Control; Money Laundering**. Neither the Company nor any Subsidiary nor, to the Company's knowledge, any director, officer, agent, employee or affiliate of the Company or any Subsidiary is currently subject to any United States sanctions administered by the Office of Foreign Assets Control of the United States Treasury Department ("***OFAC***"). The operations of the Company and its Subsidiaries are and have been conducted at all times in compliance with applicable financial record-keeping and reporting requirements of the Currency and Foreign Transactions Reporting Act of 1977, as amended, applicable money laundering statutes and applicable rules and regulations thereunder (collectively, the "***Money Laundering Laws***"), and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any Subsidiary with respect to the Money Laundering Laws is pending or, to the knowledge of the Company or any Subsidiary, threatened.

(x) **No Disqualification Events**. With respect to the Securities to be offered and sold hereunder in reliance on Rule 506 under the Securities Act, none of the Company, any of its predecessors, any affiliated issuer, any director, executive officer, other officer of the Company participating in the offering hereunder, any beneficial owner of 20% or more of the Company's outstanding voting equity securities, calculated on the basis of voting power, nor any promoter (as that term is defined in Rule 405 under the Securities Act) connected with the Company in any capacity at the time of sale (each, an "***Issuer Covered Person***" and, together, "***Issuer Covered Persons***") is subject to any of the "Bad Actor" disqualifications described in Rule 506(d)(1)(i) to (viii) under the Securities Act (a "***Disqualification Event***"), except for a Disqualification Event covered by Rule 506(d)(2) or (d)(3). The Company has exercised reasonable care to determine whether any Issuer Covered Person is subject to a Disqualification Event. The Company has complied, to the extent applicable, with its disclosure obligations under Rule 506(e), and has furnished to the Purchasers a copy of any disclosures provided thereunder.

(y) **Other Covered Persons**. Except for the compensation payable as described on ***Schedule 3.1(y)*** or in any SEC Report, the Company is not aware of any Person (other than any Issuer Covered Person) that has been or will be paid (directly or indirectly) remuneration for solicitation of purchasers in connection with the sale of any securities pursuant to Regulation D promulgated under the Securities Act during the last three years.

(z) **Sarbanes-Oxley; Internal Accounting Controls**. Except as set forth in any SEC Reports, the Company and the Subsidiaries are in compliance in all material respects with any and all applicable requirements of the Sarbanes-Oxley Act of 2002 that are effective as of the date hereof, and any and all applicable rules and regulations promulgated by the Commission thereunder that are effective as of the date hereof and as of the Closing Date. Except as set forth in any SEC Reports, the Company and the Subsidiaries maintain a system of internal accounting controls sufficient to provide reasonable assurance that: (i) transactions are executed in accordance with management's general or specific authorizations, (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with GAAP and to maintain asset accountability, (iii) access to assets is permitted only in accordance with management's general or specific authorization, and (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences. The Company and the Subsidiaries have established disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the Company and the Subsidiaries and designed such disclosure controls and procedures to ensure that information required to be disclosed by the

Company in the reports it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms. The Company's certifying officers have evaluated the effectiveness of the disclosure controls and procedures of the Company and the Subsidiaries as of the end of the period covered by the most recently filed periodic report under the Exchange Act (such date, the "***Evaluation Date***"). The Company presented in its most recently filed periodic report under the Exchange Act the conclusions of the certifying officers about the effectiveness of the disclosure controls and procedures based on their evaluations as of the Evaluation Date. Since the Evaluation Date, except as set forth in the SEC Reports, there have been no changes in the internal control over financial reporting (as such term is defined in the Exchange Act) that have materially affected, or is reasonably likely to materially affect, the internal control over financial reporting of the Company and its Subsidiaries.

(aa) **Listing and Maintenance Requirements**. The Common Stock is registered pursuant to *Section 12(b)* or *Section 12(g)* of the Exchange Act, and the Company has taken no action designed to, or which to its knowledge is likely to have the effect of, terminating the registration of the Common Stock under the Exchange Act nor has the Company received any notification that the Commission is contemplating terminating such registration. The Company has not, in the twelve (12) months preceding the date hereof, received notice from the Principal Market to the effect that the Company is not in compliance with the listing or maintenance requirements of the Principal Market. Except as set forth in ***Schedule 3.1(aa)***, the Company is, and has no reason to believe that it will not in the foreseeable future continue to be, in compliance with all such listing and maintenance requirements. The Common Stock is currently eligible for electronic transfer through the Depository Trust Company and the Company is current in payment of the fees to the Depository Trust Company in connection with such electronic transfer.

3.2 **Representations and Warranties of the Purchasers**. Each Purchaser, for itself and for no other Purchaser, hereby represents and warrants as of the date hereof and as of the Closing Date to the Company as follows (unless as of a specific date therein, in which case they shall be accurate as of such date):

(a) **Organization; Authority**. Such Purchaser is either an individual or an entity duly incorporated or formed, validly existing and in good standing under the laws of the jurisdiction of its incorporation or formation with full right, corporate, partnership, limited liability company or similar power and authority to enter into and to consummate the transactions contemplated by the Transaction Documents and otherwise to carry out its obligations hereunder and thereunder. The execution and delivery of the Transaction Documents and performance by such Purchaser of the transactions contemplated by the Transaction Documents have been duly authorized by all necessary corporate, partnership, limited liability company or similar action, as applicable, on the part of such Purchaser. Each Transaction Document to which it is a party has been duly executed by such Purchaser, and when delivered by such Purchaser in accordance with the terms hereof, will constitute the valid and legally binding obligation of such Purchaser, enforceable against it in accordance with its terms, except: (i) as limited by general equitable principles and applicable bankruptcy, insolvency, reorganization, moratorium and other laws of general application affecting enforcement of creditors' rights generally, (ii) as limited by laws relating to the availability of specific performance, injunctive relief or other equitable remedies, and (iii) insofar as indemnification and contribution provisions may be limited by applicable law.

(b) **Authorization; Enforcement**. Such Purchaser has the requisite corporate power and authority to enter into and to consummate the transactions contemplated by this Agreement and each of the other Transaction Documents and otherwise to carry out its obligations hereunder and thereunder. The execution and delivery of this Agreement and each of the other Transaction Documents by such Purchaser and the consummation by it of the transactions contemplated hereby and thereby have been duly authorized by all necessary action on the part of such Purchaser and no further action is required by such Purchaser in connection herewith or therewith. This Agreement and each other Transaction Document to which it is a party has been (or upon delivery will have been) duly executed by such Purchaser and, when delivered in accordance with the terms hereof and thereof, will constitute the valid and binding obligation of such Purchaser enforceable against such Purchaser in accordance with its terms, except: (i) as limited by general equitable principles and applicable bankruptcy, insolvency, reorganization, moratorium and other laws of general application affecting enforcement of creditors' rights generally, (ii) as limited by laws relating to the availability of specific performance, injunctive relief or other equitable remedies, and (iii) insofar as indemnification and contribution provisions may be limited by applicable law.

(c) **No Conflicts**. The execution, delivery and performance by such Purchaser of this Agreement and the other Transaction Documents to which it is a party and the consummation by it of the transactions contemplated hereby and thereby do not and will not: (i) conflict with or violate any provision of the Purchaser's certificate or articles of incorporation, bylaws or other organizational or charter documents, or (ii) conflict with or result in a violation of any law, rule, regulation, order, judgment, injunction, decree or other restriction of any court or Governmental Authority to which such Purchaser is subject (including federal and state securities laws and regulations).

(d) **Filings, Consents and Approvals**. Such Purchaser is not required to obtain any consent, waiver, authorization or order of, give any notice to, or make any filing or registration with, any court or other foreign, federal, state, local or other Governmental Authority in connection with the execution, delivery and performance by such Purchaser of the Transaction Documents.

(e) **Own Account**. Such Purchaser understands that the Securities are "restricted securities" and have not been registered under the Securities Act or any applicable state securities law and is acquiring the Securities as principal for its own account and not with a view to or for distributing or reselling such Securities or any part thereof in violation of the Securities Act or any applicable state securities law; provided, this representation and warranty shall not be deemed to limit such Purchaser's right to sell the Securities in compliance with applicable federal and state securities laws. Such Purchaser does not presently have any agreement or understanding, directly or indirectly, with any Person to distribute any of the Securities.

(f) **Purchaser Status**. At the time such Purchaser was offered the Securities, it was, and as of the date hereof it is an "accredited investor" as defined in *Rule 501(a)(1)*, *(a)(2)*, *(a)(3)*, *(a)(7)* or *(a)(8)* under the Securities Act.

(g) **Intentionally Omitted**.

(h) **General Solicitation**. Such Purchaser is not, to such Purchaser's knowledge, purchasing the Securities as a result of any advertisement, article, notice or other

communication regarding the Securities published in any newspaper, magazine or similar media or broadcast over television or radio or presented at any seminar or, to the knowledge of such Purchaser, any other general solicitation or general advertisement.

(i) **Intentionally Omitted**.

The Company acknowledges and agrees that the representations contained in this ***Section 3.2*** shall not modify, amend or affect such Purchaser's right to rely on the Company's representations and warranties contained in this Agreement or any representations and warranties contained in any other Transaction Document or any other document or instrument executed and/or delivered in connection with this Agreement or the consummation of the transaction contemplated hereby.

ARTICLE IV.
OTHER AGREEMENTS OF THE PARTIES

4.1 **Furnishing of Information; Public Information; Transfer Restrictions; Legends**.

(a) If the Common Stock is not registered under *Section 12(b)* or *Section 12(g)* of the Exchange Act on the date hereof, the Company agrees to cause the Common Stock to be registered under *Section 12(g)* of the Exchange Act on or before the sixtieth (60th) calendar day following the date hereof. Until the time that no Purchaser owns Securities, the Company covenants to maintain the registration of the Common Stock under *Section 12(b)* or *Section 12(g)* of the Exchange Act and to timely file (or obtain extensions in respect thereof and file within the applicable grace period) all reports required to be filed by the Company after the date hereof pursuant to the Exchange Act even if the Company is not then subject to the reporting requirements of the Exchange Act.

(b) At any time during the period commencing from the six (6) month anniversary of the date hereof and ending at such time that all of the Securities may be sold without the requirement for the Company to be in compliance with *Rule 144(c)(1)* and otherwise without restriction or limitation pursuant to *Rule 144*, if the Company (i) shall fail for any reason to satisfy the current public information requirement under *Rule 144(c)* or (ii) has ever been an issuer described in Rule 144(i)(1)(i) or becomes such an issuer in the future, and the Company fails to satisfy the any condition of set forth in Rule 144(i)(2) (a "***Public Information Failure***") (for the avoidance of doubt, a Public Information Failure shall be deemed to have occurred during any extension pursuant to *Rule 12b-25* of the deadline for the filing of the Company's annual and periodic reports with the Commission), then, in addition to such Purchaser's other available remedies, the Company shall pay to a Purchaser, in cash, as partial liquidated damages and not as a penalty, by reason of any such delay in or reduction of its ability to sell the Securities, an amount in cash equal to 0.5% of the aggregate Subscription Amount of such Purchaser's Securities on the day of a Public Information Failure and such amount on each 30th day thereafter until the earlier of (a) the date such Public Information Failure is cured, and (b) such time that such public information is no longer required for the Purchasers to transfer the Debenture Shares pursuant to *Rule 144*. The payments to which a Purchaser shall be entitled pursuant to this ***Section 4.3(b)*** are referred to herein as "***Public Information Failure Payments***." Public Information Failure

Payments shall be paid on the earlier of (i) the last day of the calendar month during which such Public Information Failure Payments are incurred, and (ii) the third (3rd) Business Day after the event or failure giving rise to the Public Information Failure Payments is cured. In the event the Company fails to make Public Information Failure Payments in a timely manner, such Public Information Failure Payments shall bear interest at the rate of 0.5% per month (prorated for partial months) until paid in full. Nothing herein shall limit such Purchaser's right to pursue actual damages for the Public Information Failure, and such Purchaser shall have the right to pursue all remedies available to it at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief.

(c) The Securities may only be disposed of in compliance with state and federal securities laws. In connection with any transfer of Securities other than pursuant to an effective registration statement or Rule 144, to the Company or to an Affiliate of a Purchaser or in connection with a pledge as contemplated in Section 4.1(e), the Company may require the transferor thereof to provide to the Company an opinion of counsel selected by the transferor, the form and substance of which opinion shall be reasonably satisfactory to the Company, to the effect that such transfer does not require registration of such transferred Securities under the Securities Act. As a condition of transfer, any such transferee shall agree in writing to be bound by the terms of this Agreement and shall have the rights and obligations of a Purchaser under this Agreement.

(d) The Purchasers agree to the imprinting, so long as is required by this Section 4.1, of a legend on any of the Securities in the following form:

> NEITHER THIS SECURITY NOR THE SECURITIES ISSUABLE HEREUNDER HAVE BEEN REGISTERED WITH THE SECURITIES AND EXCHANGE COMMISSION OR THE SECURITIES COMMISSION OF ANY STATE IN RELIANCE UPON AN EXEMPTION FROM REGISTRATION UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"), AND, ACCORDINGLY, MAY NOT BE OFFERED OR SOLD EXCEPT PURSUANT TO AN EFFECTIVE REGISTRATION STATEMENT UNDER THE SECURITIES ACT OR PURSUANT TO AN AVAILABLE EXEMPTION FROM, OR IN A TRANSACTION NOT SUBJECT TO, THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT AND IN ACCORDANCE WITH APPLICABLE STATE SECURITIES LAWS AS EVIDENCED BY A LEGAL OPINION OF COUNSEL TO THE TRANSFEROR TO SUCH EFFECT, THE SUBSTANCE OF WHICH SHALL BE REASONABLY ACCEPTABLE TO THE COMPANY. THIS SECURITY AND THE SECURITIES ISSUABLE HEREUNDER MAY BE PLEDGED WITH A FINANCIAL INSTITUTION THAT IS AN "ACCREDITED INVESTOR" AS DEFINED IN RULE 501(a) UNDER THE SECURITIES ACT IN CONNECTION WITH A BONA FIDE MARGIN ACCOUNT OR OTHER LOAN.

(e) The Company acknowledges and agrees that a Purchaser may from time to time pledge pursuant to a bona fide margin agreement with a registered broker-dealer or grant a security interest in some or all of the Securities to a financial institution that is an "accredited investor" as defined in Rule 501(a) under the Securities Act and, if required under the terms of

such arrangement, such Purchaser may transfer pledged or secured Securities to the pledgees or secured parties. Such a pledge or transfer would not be subject to approval of the Company and no legal opinion of legal counsel of the pledgee, secured party or pledgor shall be required in connection therewith. Further, no notice shall be required of such pledge.

(f) If any Debenture Shares are issued pursuant to the Debenture or a Warrant is exercised into Warrant Shares, in each case, (x) at any time on or after the six (6) months anniversary of the Closing Date or (y) when there is an effective registration statement under the Securities Act covering the resale of such Debenture Shares and/or Warrant Shares, then such Debenture Shares or Warrant Shares (assuming with respect to the Warrants, that if there is no effective registration statement covering the resale of the Warrant Shares, such Warrants are exercised on a cashless basis), as the case may be, shall be issued free of all legends, including the legend set forth in Section 4.1(d).

4.2 **Integration**. The Company shall not sell, offer for sale or solicit offers to buy or otherwise negotiate in respect of any security (as defined in *Section 2* of the Securities Act) that would be integrated with the offer or sale of the Securities in a manner that would require the registration under the Securities Act of the sale of the Securities or that would be integrated with the offer or sale of the Securities for purposes of the rules and regulations of the Principal Market such that it would require stockholder approval prior to the closing of such other transaction unless stockholder approval is obtained before the closing of such subsequent transaction.

4.3 **Acknowledgment of Dilution**. The Company acknowledges that the issuance of the Securities may result in dilution of the outstanding shares of Common Stock, which dilution may be substantial under certain market conditions. The Company further acknowledges that its obligations under the Transaction Documents to issue the Securities pursuant to the Transaction Documents, are unconditional and absolute and not subject to any right of set off, counterclaim, delay or reduction, regardless of the effect of any such dilution or any claim the Company may have against any Purchaser and regardless of the dilutive effect that such issuance may have on the ownership of the other stockholders of the Company.

4.4 **[Intentionally Omitted]**

4.5 **Redemption Procedures**. The form of Holder Redemption Notice included in the Debentures collectively set forth the totality of the procedures required of the Purchasers in order to redeem the Debentures. Without limiting the preceding sentences, no ink-original Holder Redemption Notice shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any such notice be required in order to redeem the Debentures. No additional legal opinion, other information or instructions shall be required of the Purchasers to redeem their Debentures. The Company shall honor redemptions of the Debentures and shall deliver Debenture Shares in accordance with the terms, conditions and time periods set forth in the Transaction Documents.

4.6 **Securities Laws Disclosure; Publicity**. The Company shall promptly after the execution of this Agreement (or in any case, by no later than 8:30 a.m. (local time in New York, New York) on the third (3rd) Trading Day immediately following the date hereof, file with the Commission a Current Report Form 8-K disclosing all of the material terms hereof and attaching

the Transaction Documents as exhibits thereto. Upon the filing of such Current Report on Form 8-K, the Company represents to the Purchasers that it shall have publicly disclosed all "material, non-public information" delivered to any of the Purchasers by the Company or any of its Subsidiaries, or any of their respective officers, directors, employees or agents in connection with the transactions contemplated by the Transaction Documents, except for the information set forth on ***Schedule 3.1(r)***, which shall be publicly disclosed no later than thirty (30) days after the date hereof or in the absence of such disclosure the Company shall confirm in writing that such information is no longer material non-public information. The Company and the Purchasers shall consult with each other in issuing any other public announcements or press releases with respect to the transactions contemplated hereby, and neither the Company nor the Purchasers shall issue any such public announcement or press release nor otherwise make any such public statement or communication without the prior consent of the Company, with respect to any disclosure of the Purchasers, or without the prior consent of the Purchasers representing at least 50.1% of the outstanding Principal Amount of the Debentures, with respect to any disclosure of the Company, which consent shall not unreasonably be withheld or delayed, except if such disclosure is required by law, then the disclosing party shall, to the extent lawful and practicable (having regard to time and in the case of the Company, the Company's continuous disclosure obligations), promptly provide the other party with prior notice of such public announcement, press release, public statement or communication.

4.7 **Disclosure of Material Information; No Obligation of Confidentiality**.

(a) Except with respect to the material terms and conditions of the transactions contemplated by the Transaction Documents, the Company covenants and agrees that neither it, nor any other Person acting on its behalf, has provided prior to the date hereof or will in the future provide any Purchaser or its agents or counsel with any information that the Company believes constitutes material non-public information unless prior thereto such Purchaser shall have entered into a written agreement with the Company regarding the confidentiality and use of such information. The Company understands and confirms that each Purchaser shall be relying on the foregoing covenant in effecting transactions in securities of the Company. In the event of a breach of the foregoing covenant by the Company, or any of its Subsidiaries, or any of its or their respective officers, directors, employees and agents, in addition to any other remedy provided herein or in the Transaction Documents, the Company shall, unless otherwise agreed by Purchasers representing at least 50.1% of the outstanding Principal Amount of the Debentures, publicly disclose any "material, non-public information" in a Current Report on Form 8-K filed with the Commission within one (1) business day following the date that it discloses such information to any Purchaser or such earlier time as may be required by applicable law. Any Current Report on Form 8-K filed with the Commission by the Company pursuant to this ***Section 4.7(a)*** shall be subject to prior review and comment by the applicable Purchasers. From and after the filing of any such Current Report on Form 8-K pursuant to this ***Section 4.7(a)***, no Purchaser shall be deemed to be in possession of any material, nonpublic information regarding the Company existing as of the time of such filing.

(b) No Purchaser shall be deemed to have any obligation of confidentiality with respect to (i) any non-public information of the Company disclosed to such Purchaser in

breach of ***Section 4.7(a)*** (whether or not the Company files a Current Report on Form 8-K as provided above), (ii) the fact that any Purchaser has exercised any of its rights and/or remedies under the Transaction Documents, or (iii) any information obtained by any Purchaser as a result of exercising any of its rights and/or remedies under the Transaction Documents. In addition, no Purchaser shall be deemed to be in breach of any duty to the Company and/or to have misappropriated any non-public information of the Company, if such Purchaser engages in transactions of securities of the Company, including, without limitation, any hedging transactions, short sales or any "derivative" transactions while in possession of such non-public information.

4.8 **Use of Proceeds**. The Company shall use the net proceeds from the sale of the Debentures hereunder solely for general corporate purposes, and shall not, under any circumstances, use such proceeds: (i) for the redemption of any Common Stock or Common Stock Equivalents, (ii) the repayment of any Indebtedness (except as expressly provided in ***subclause (b)*** above), or (iii) in violation of the Foreign Corrupt Practices Act of 1970, as amended or similar laws or OFAC regulations.

4.9 **Indemnification of Purchasers**. Subject to the provisions of this ***Section 4.9***, the Company will indemnify and hold each Purchaser and its directors, officers, stockholders, members, partners, employees and agents (and any other Persons with a functionally equivalent role of a Person holding such titles notwithstanding a lack of such title or any other title), each Person who controls such Purchaser (within the meaning of *Section 15* of the Securities Act and *Section 20* of the Exchange Act), and the directors, officers, stockholders, agents, members, partners or employees (and any other Persons with a functionally equivalent role of a Person holding such titles notwithstanding a lack of such title or any other title) of such controlling Persons (each, a "***Purchaser Party***") harmless from any and all losses, liabilities, obligations, claims, contingencies, damages, costs and expenses, including all judgments, amounts paid in settlements, court costs and reasonable attorneys' fees, costs of investigation and costs of enforcing this indemnity that any such Purchaser Party may suffer or incur as a result of or relating to (a) any breach of any of the representations, warranties, covenants or agreements made by the Company in this Agreement or in the other Transaction Documents, or (b) any action instituted against the Purchaser Parties in any capacity, or any of them or their respective Affiliates, by any stockholder of the Company who is not an Affiliate of such Purchaser Party, with respect to any of the transactions contemplated by the Transaction Documents (unless such action is based upon a breach of such Purchaser Party's representations, warranties or covenants under the Transaction Documents or any violations by such Purchaser Party of foreign, federal or state securities laws or any conduct by such Purchaser Party which constitutes fraud, gross negligence, bad faith or willful misconduct). If any action shall be brought against any Purchaser Party in respect of which indemnity may be sought pursuant to this Agreement, such Purchaser Party shall promptly notify the Company in writing, and the Company shall have the right to assume the defense thereof with counsel of its own choosing reasonably acceptable to the Purchaser Party. Any Purchaser Party shall have the right to employ separate counsel in any such action and participate in the defense thereof, but the fees and expenses of such counsel shall be at the expense of such Purchaser Party except to the extent that (i) the employment thereof has been specifically authorized by the Company in writing, (ii) the Company has failed after a reasonable period of time to assume such defense and to employ counsel, or (iii) in such action there is, in the reasonable written opinion of

counsel, a material conflict on any material issue between the position of the Company and the position of such Purchaser Party, in which case the Company shall be responsible for the reasonable, actual and documented fees and expenses of no more than one such separate counsel. The Company will not be liable to any Purchaser Party under this Agreement (y) for any settlement by a Purchaser Party effected without the Company's prior written consent, which shall not be unreasonably withheld or delayed; or (z) to the extent, but only to the extent that a loss, claim, damage or liability is attributable to any Purchaser Party's breach of any of the representations, warranties, covenants or agreements made by such Purchaser Party in this Agreement or in the other Transaction Documents or is attributable to any conduct by such Purchaser Party which constitutes fraud, gross negligence, bad faith or willful misconduct. The Company shall not settle or compromise any claim for which a Purchaser Party seeks indemnification hereunder without the prior written consent of such Purchaser Party, which consent shall not be unreasonably withheld or delayed. The indemnification required by this ***Section 4.9*** shall be made by periodic payments of the amount thereof during the course of the investigation or defense, as and when bills are received or are incurred. The indemnity agreements contained herein shall be in addition to any cause of action or similar right of any Purchaser Party against the Company or others and any liabilities the Company may be subject to pursuant to law.

4.10 **Reservation and Listing of Securities**. The Company shall maintain a reserve from its duly authorized shares of Common Stock for issuance pursuant to the Transaction Documents in such amount as may then be required to fulfill its obligations in full under the Transaction Documents. If, on any date, the number of authorized but unissued (and otherwise unreserved) shares of Common Stock is insufficient to fulfill its obligations in full under the Transaction Documents on such date, then the Board of Directors shall use commercially reasonable efforts to amend the Company's certificate or articles of incorporation to increase the number of authorized but unissued shares of Common Stock to at least the number required to fulfill its obligations in full under the Transaction Documents at such time, as soon as possible and in any event not later than the seventy fifth (75th) day after such date.

4.11 **Capital Changes**. Until date that the Debentures are no longer outstanding, the Company shall not undertake a reverse or forward stock split or reclassification of the Common Stock without the prior written consent of Purchasers representing at least 50.1% of the outstanding Principal Amount of the Debentures, provided that, the Company shall be permitted to undertake a reverse or forward stock split without the consent of any Purchaser to the extent it determines, in its sole and absolute discretion, that the stock split is necessary to prevent the delisting of the Common Stock from the Principal Market.

4.12 **Registration of Warrant Shares.**

(a) Filing of the Initial Registration Statements. The Warrant Shares will be registered for resale on a new resale registration statement on, at the Company's discretion, Form S-1 or Form S-3 (the "**Registration Statement**") which shall be filed by the Company with the Commission, at the Company's sole expense, on or before the later of (1) fifteen (15) days following the due date for the Company's Annual Report on Form 10-K for the year ended December 31, 2022 and (2) thirty (30) days after the Closing. The Company shall use its best efforts to cause such Registration Statement to be declared effective by the Commission at the earliest practicable time, but in any event not later than the date that is ninety (90) days after the

date of this Agreement, and to remain continuously effective until the earlier of (x) the expiration of the Warrants and (y) the date that all Warrant Shares have been disposed by the Purchasers or could be disposed of pursuant to Rule 144 without restriction.

(b) Related Obligations. As promptly as practicable after becoming aware of such event or facts, the Company shall notify the Purchasers in writing of the happening of any event or existence of such facts as a result of which the prospectus included in the Registration Statement, as then in effect, includes an untrue statement of a material fact or omits to state a material fact required to be stated therein or necessary to make the statements therein, in light of the circumstances under which they were made, not misleading, and promptly prepare a supplement or amendment to the Registration Statement to correct such untrue statement or omission, and deliver a copy of such supplement or amendment to the Purchasers (or such other number of copies as the Purchasers may reasonably request). The Company shall also (i) prepare and file with the Commission such amendments and supplements to the Registration Statement and the prospectus used in connection therewith as may be necessary to keep such Registration Statement continuously effective and to comply with the provisions of the Securities Act with respect to the disposition of all securities covered by the Registration Statement in accordance with the Purchasers intended method of disposition, (ii) use its commercially reasonable efforts to register or qualify the securities covered by the Registration Statement under the securities or blue sky laws of such jurisdictions as the Purchasers may reasonably request; and (iii) notify each Purchaser when the prospectus or any prospectus supplement or post-effective amendment has been filed, and, with respect to the Registration Statement or any post-effective amendment, when the same has become effective, of any request by the Commission for amendments or supplements to the Registration Statement or to amend or to supplement such prospectus or for additional information or of the issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement or the initiation of any proceedings for that purpose.

(c) Suspension Event. Notwithstanding anything to the contrary in this Agreement, the Company shall be entitled to delay the filing or effectiveness of, or suspend the use of, a Registration Statement if (i) it reasonably determines that in order for such Registration Statement not to contain a material misstatement or omission, an amendment thereto would be needed to include information that at that time could not otherwise be included in a current, quarterly, or annual report under the Exchange Act, or (ii) the negotiation or consummation of a transaction by the Company or its Subsidiaries is pending or an event has occurred, which negotiation, consummation or event, the Company's board of directors reasonably believes, upon the advice of outside legal counsel, would require additional disclosure by the Company in such Registration Statement of material information that the Company has a bona fide business purpose for keeping confidential and the non-disclosure of which in such Registration Statement would be expected, in the reasonable determination of the Company's board of directors, upon the advice of outside legal counsel, to cause such Registration Statement to fail to comply with applicable disclosure requirements, (each such circumstance, a "Suspension Event"); *provided*, *however*, that the Company may not delay or suspend any Registration Statement on more than two occasions or for more than forty-five (45) consecutive calendar days, or more than ninety (90) total calendar days in each case during any twelve-month period.

(d) Additional Registrations Statements. In the event the number of shares of Common Stock available under the Registration Statements is insufficient to cover the Warrant

Shares underlying the Warrants, the Company shall use its reasonable best efforts to amend such registration statement or file a new registration statement, so as to cover all such Warrant Shares not later than fifteen (15) Trading Days after the necessity therefor arises. The Company shall use its reasonable best efforts to cause such amendment and/or new Registration Statement to become effective as soon as practicable following the filing thereof.

ARTICLE V.
MISCELLANEOUS

5.1 **Fees and Expenses**. At the Closing, the Company has agreed to reimburse the Purchasers for their reasonable and documented legal fees and out-of-pocket expenses, $50,000 of which has been paid to the Purchasers prior to the Closing. Except as expressly set forth in the Transaction Documents to the contrary, each party shall pay the fees and expenses of its advisers, counsel, accountants and other experts, if any, and all other expenses incurred by such party incident to the negotiation, preparation, execution, delivery and performance of this Agreement. The Company shall pay all stamp taxes and other taxes and duties levied in connection with the delivery of any Securities to the Purchasers.

5.2 **Entire Agreement**. The Transaction Documents, together with the exhibits and schedules thereto, contain the entire understanding of the parties with respect to the subject matter hereof and thereof and supersede all prior agreements and understandings, oral or written, with respect to such matters, which the parties acknowledge have been merged into such documents, exhibits and schedules.

5.3 **Notices**. Any and all notices or other communications or deliveries required or permitted to be provided hereunder shall be in writing and shall be deemed given and effective on the earliest of: (a) the date of transmission, if such notice or communication is delivered via or email as set forth on the signature pages attached hereto at or prior to 5:30 p.m. (New York City time) on a Business Day, (b) the next Business Day after the date of transmission, if such notice or communication is delivered email as set forth on the signature pages attached hereto on a day that is not a Business Day or later than 5:30 p.m. (New York City time) on any Business Day, (c) the second (2nd) Business Day following the date of mailing, if sent by a nationally recognized overnight courier service, or (d) upon actual receipt by the party to whom such notice is required to be given. The address for such notices and communications shall be as set forth on the signature pages attached hereto.

5.4 **Amendments; Waivers**. No provision of this Agreement may be waived, modified, supplemented or amended except in a written instrument signed, in the case of an amendment, by the Company and the Purchasers representing at least 50.1% of the outstanding Principal Amount of the Debentures or, in the case of a waiver, by the party against whom enforcement of any such waived provision is sought. No waiver of any default with respect to any provision, condition or requirement of this Agreement shall be deemed to be a continuing waiver in the future or a waiver of any subsequent default or a waiver of any other provision, condition or requirement hereof, nor shall any delay or omission of any party to exercise any right hereunder in any manner impair the exercise of any such right.

5.5 **Headings**. The headings herein are for convenience only, do not constitute a part of this Agreement and shall not be deemed to limit or affect any of the provisions hereof.

5.6 **Successors and Assigns**. This Agreement shall be binding upon and inure to the benefit of the parties and their successors and permitted assigns. The Company may not assign this Agreement or any rights or obligations hereunder without the prior written consent of Purchasers representing at least 50.1% of the outstanding Principal Amount of the Debentures. Any Purchaser may assign, with written notice to the Company of such assignment, any or all of its rights under this Agreement to any Person to whom such Purchaser assigns or transfers any Securities in compliance with the Transaction Documents, provided that such transferee agrees in writing to be bound, with respect to the transferred Securities, by the provisions of the Transaction Documents that apply to the "Purchasers."

5.7 **No Third Party Beneficiaries**. This Agreement is intended for the benefit of the parties hereto and their respective successors and permitted assigns and is not for the benefit of, nor may any provision hereof be enforced by, any other Person, except as otherwise set forth in ***Section 4.9*** and this ***Section 5.7***.

5.8 **Governing Law**. All questions concerning the construction, validity, enforcement and interpretation of the Transaction Documents shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflicts of law thereof. Each party agrees that all legal proceedings concerning the interpretations, enforcement and defense of the transactions contemplated by this Agreement and any other Transaction Documents (whether brought against a party hereto or its respective affiliates, directors, officers, stockholders, partners, members, employees or agents) shall be commenced exclusively in the state and federal courts sitting in the City of New York. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the City of New York, Borough of Manhattan for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein (including with respect to the enforcement of any of the Transaction Documents), and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is improper or is an inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Agreement and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law.

5.9 **Survival**. The representations and warranties contained herein shall survive the Closing and the delivery of the Debentures.

5.10 **Execution**. This Agreement may be executed in two or more counterparts, all of which when taken together shall be considered one and the same agreement and shall become effective when counterparts have been signed by each party and delivered to each other party, it being understood that the parties need not sign the same counterpart. In the event that any signature

is delivered by e-mail delivery of a ".pdf" format data file, such signature shall create a valid and binding obligation of the party executing (or on whose behalf such signature is executed) with the same force and effect as if such ".pdf" signature page were an original thereof.

5.11 **Severability**. If any term, provision, covenant or restriction of this Agreement is held by a court of competent jurisdiction to be invalid, illegal, void or unenforceable, the remainder of the terms, provisions, covenants and restrictions set forth herein shall remain in full force and effect and shall in no way be affected, impaired or invalidated, and the parties hereto shall use their commercially reasonable efforts to find and employ an alternative means to achieve the same or substantially the same result as that contemplated by such term, provision, covenant or restriction. It is hereby stipulated and declared to be the intention of the parties that they would have executed the remaining terms, provisions, covenants and restrictions without including any of such that may be hereafter declared invalid, illegal, void or unenforceable.

5.12 **Rescission and Withdrawal Right**. Notwithstanding anything to the contrary contained in (and without limiting any similar provisions of) any of the other Transaction Documents, whenever any Purchaser exercises a right, election, demand or option under a Transaction Document and the Company does not timely perform its related obligations within the periods therein provided, then such Purchaser may rescind or withdraw, in its discretion from time to time upon written notice to the Company, any relevant conversion, redemption or exercise notice, demand or election in whole or in part without prejudice to its future actions and rights; *provided*, *however*, that in the case of a rescission of a conversion or redemption of a Debenture, the applicable Purchaser shall be required to return any shares of Common Stock subject to any such rescinded conversion, redemption or exercise notice concurrently with the return to such Purchaser of the aggregate exercise price paid to the Company for such shares and the restoration of such Purchaser's right to acquire such shares pursuant to such Purchaser's Debenture.

5.13 **Replacement of Securities**. If any certificate or instrument evidencing any Securities is mutilated, lost, stolen or destroyed, the Company shall issue or cause to be issued in exchange and substitution for and upon cancellation thereof (in the case of mutilation), or in lieu of and substitution therefor, a new certificate or instrument, but only upon receipt of evidence reasonably satisfactory to the Company of such loss, theft or destruction.

5.14 **Remedies**. In addition to being entitled to exercise all rights provided herein or granted by law, including recovery of damages, each of the Purchasers and the Company will be entitled to specific performance under the Transaction Documents. The parties agree that monetary damages may not be adequate compensation for any loss incurred by reason of any breach of obligations contained in the Transaction Documents and hereby agree to waive and not to assert in any action for specific performance of any such obligation the defense that a remedy at law would be adequate.

5.15 **Payment Set Aside**. To the extent that the Company makes a payment or payments to any Purchaser pursuant to any Transaction Document or a Purchaser enforces or exercises its rights thereunder, and such payment or payments or the proceeds of such enforcement or exercise or any part thereof are subsequently invalidated, declared to be fraudulent or preferential, set aside, recovered from, disgorged by or are required to be refunded, repaid or otherwise restored to the Company, a trustee, receiver or any other Person under any law (including, without limitation, any

bankruptcy law, state or federal law, common law or equitable cause of action), then to the extent of any such restoration the obligation or part thereof originally intended to be satisfied shall be revived and continued in full force and effect as if such payment had not been made or such enforcement or setoff had not occurred.

5.16 **Usury**. To the extent it may lawfully do so, the Company hereby agrees not to insist upon or plead or in any manner whatsoever claim, and will resist any and all efforts to be compelled to take the benefit or advantage of, usury laws wherever enacted, now or at any time hereafter in force, in connection with any claim, action or proceeding that may be brought by any Purchaser in order to enforce any right or remedy under any Transaction Document. Notwithstanding any provision to the contrary contained in any Transaction Document, it is expressly agreed and provided that the total liability of the Company under the Transaction Documents for payments in the nature of interest shall not exceed the maximum lawful rate authorized under applicable law (the "***Maximum Rate***"), and, without limiting the foregoing, in no event shall any rate of interest or default interest, or both of them, when aggregated with any other sums in the nature of interest that the Company may be obligated to pay under the Transaction Documents exceed such Maximum Rate. It is agreed that if the maximum contract rate of interest allowed by law and applicable to the Transaction Documents is increased or decreased by statute or any official governmental action subsequent to the date hereof, the new maximum contract rate of interest allowed by law will be the Maximum Rate applicable to the Transaction Documents from the effective date thereof forward, unless such application is precluded by applicable law. If under any circumstances whatsoever, interest in excess of the Maximum Rate is paid by the Company to any Purchaser with respect to indebtedness evidenced by the Transaction Documents, such excess shall be applied by such Purchaser to the unpaid principal balance of any such indebtedness or be refunded to the Company, the manner of handling such excess to be at such Purchaser's election.

5.17 **Independent Nature of Purchasers' Obligations and Rights**. The obligations of each Purchaser under any Transaction Document are several and not joint with the obligations of any other Purchaser, and no Purchaser shall be responsible in any way for the performance or non-performance of the obligations of any other Purchaser under any Transaction Document. Nothing contained herein or in any other Transaction Document, and no action taken by any Purchaser pursuant hereto or thereto, shall be deemed to constitute the Purchasers as a partnership, an association, a joint venture or any other kind of entity, or create a presumption that the Purchasers are in any way acting in concert or as a group with respect to such obligations or the transactions contemplated by the Transaction Documents. Each Purchaser shall be entitled to independently protect and enforce its rights, including, without limitation, the rights arising out of this Agreement or out of the other Transaction Documents, and it shall not be necessary for any other Purchaser to be joined as an additional party in any proceeding for such purpose. The Company has elected to provide all Purchasers with the same terms and Transaction Documents for the convenience of the Company and not because it was required or requested to do so by any of the Purchasers.

5.18 **Liquidated Damages**. The Company's obligations to pay any partial liquidated damages or other amounts owing under the Transaction Documents is a continuing obligation of the Company and shall not terminate until all unpaid partial liquidated damages and other amounts have been paid notwithstanding the fact that the instrument or security pursuant to which such partial liquidated damages or other amounts are due and payable shall have been canceled.

5.19 **Saturdays, Sundays, Holidays, etc**. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Business Day, then such action may be taken or such right may be exercised on the next succeeding Business Day.

5.20 **Construction**. The parties agree that each of them and/or their respective counsel have reviewed and had an opportunity to revise the Transaction Documents and, therefore, the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of the Transaction Documents or any amendments thereto. In addition, each and every reference to share prices and shares of Common Stock in any Transaction Document shall be subject to adjustment for reverse and forward stock splits, stock dividends, stock combinations and other similar transactions of the Common Stock that occur after the date of this Agreement.

5.21 **WAIVER OF JURY TRIAL. IN ANY ACTION, SUIT, OR PROCEEDING IN ANY JURISDICTION BROUGHT BY ANY PARTY AGAINST ANY OTHER PARTY, THE PARTIES EACH KNOWINGLY AND INTENTIONALLY, TO THE GREATEST EXTENT PERMITTED BY APPLICABLE LAW, HEREBY ABSOLUTELY, UNCONDITIONALLY, IRREVOCABLY AND EXPRESSLY WAIVES FOREVER TRIAL BY JURY.**

5.22 **Agent**.

(a) **Appointment**. Each Purchaser hereby (i) appoints Agent, as the collateral agent hereunder and under the other Security Documents, and (ii) authorizes the Agent (and its officers, directors, employees and agents) to take such action on such Purchaser's behalf in accordance with the terms hereof and thereof. The Agent shall not have, by reason hereof or any of the other Security Documents, a fiduciary relationship in respect of any Purchaser. Neither the Agent nor any of its officers, directors, employees or agents shall have any liability to any Purchaser for any action taken or omitted to be taken in connection hereof or any other Security Document except to the extent caused by its own gross negligence or willful misconduct, and each Purchaser agrees to defend, protect, indemnify and hold harmless the Agent and all of its officers, directors, employees and agents (collectively, the "***Agent Indemnitees***") from and against any losses, damages, liabilities, obligations, penalties, actions, judgments, suits, fees, costs and expenses (including, without limitation, reasonable attorneys' fees, costs and expenses) incurred by such Agent Indemnitee, whether direct, indirect or consequential, arising from or in connection with the performance by such Agent Indemnitee of the duties and obligations of Agent pursuant hereto or any of the Security Documents. The Agent shall not be required to exercise any discretion or take any action, but shall be required to act or to refrain from acting (and shall be fully protected in so acting or refraining from acting) upon the instructions of the Required Holders (as defined in the Note), and such instructions shall be binding upon all holders of Notes; provided, however, that the Agent shall not be required to take any action which, in the reasonable opinion of the Agent, exposes the Agent to liability or which is contrary to this Agreement or any other Transaction Document or applicable law. The Agent shall be entitled to rely upon any written notices, statements, certificates, orders or other documents or any telephone message believed by it in good faith to be genuine and correct and to have been signed, sent or made by the proper Person, and

with respect to all matters pertaining to this Agreement or any of the other Transaction Documents and its duties hereunder or thereunder, upon advice of counsel selected by it.

(b) **Successor Agent**.

(i) The Agent may resign from the performance of all its functions and duties hereunder and under the other Transaction Documents at any time by giving at least ten (10) Business Days' prior written notice to the Company and each holder of Notes. Such resignation shall take effect upon the acceptance by a successor Agent of appointment pursuant to clauses (ii) and (iii) below or as otherwise provided below. The Required Holders may, by written consent, remove the Agent from all its functions and duties hereunder and under the other Transaction Documents.

(ii) Upon any such notice of resignation or removal, the Holders shall appoint a successor collateral agent. Upon the acceptance of any appointment as Agent hereunder by a successor agent, such successor collateral agent shall thereupon succeed to and become vested with all the rights, powers, privileges and duties of the collateral agent, and the Agent shall be discharged from its duties and obligations under this Agreement and the other Transaction Documents. After the Agent's resignation or removal hereunder as the collateral agent, the provisions of this ***Section 5.22(b)(ii)*** shall inure to its benefit as to any actions taken or omitted to be taken by it while it was the Agent under this Agreement and the other Transaction Documents.

(iii) If a successor collateral agent shall not have been so appointed within ten (10) Business Days of receipt of a written notice of resignation or removal, the Agent shall then appoint a successor collateral agent who shall serve as the Agent until such time, if any, as the Required Holders appoint a successor collateral agent as provided above.

(iv) In the event that a successor Agent is appointed pursuant to the provisions of this ***Section 5.22(b)(iv)*** that is not a Purchaser or an affiliate of any Purchaser (or the Required Holders or the Agent (or its successor), as applicable, notify the Company that they or it wants to appoint such a successor Agent pursuant to the terms of this ***Section 5.22***), the Company and each Subsidiary thereof covenants and agrees to promptly take all actions reasonably requested by the Required Holders or the Agent (or its successor), as applicable, from time to time, to secure a successor Agent satisfactory to the requesting part(y)(ies), in their sole discretion, including, without limitation, by paying all reasonable and customary fees and expenses of such successor Agent, by having the Company and each Subsidiary thereof agree to indemnify any successor Agent pursuant to reasonable and customary terms and by each of the Company and each Subsidiary thereof executing a collateral agency agreement or similar agreement and/or any amendment to the Security Documents reasonably requested or required by the successor Agent.

5.23 **Termination**. This Agreement may be terminated by (a) any Purchaser, as to such Purchaser's obligations hereunder only and without any effect whatsoever on the obligations between the Company and the other Purchasers, by written notice to the other parties, if the Closing has not been consummated on or before [●], or (b) the Company, by written notice to the other parties, if the Closing has not been consummated on or before [●]; provided, however, that in

either case such termination will not affect the right of any party to sue for any breach of this Agreement by any other party (or parties).

(Signature Pages Follow)

IN WITNESS WHEREOF, the parties hereto have caused this Securities Purchase Agreement to be duly executed by their respective authorized signatories as of the date first indicated above.

22nd Century Group, Inc.

By: /s/ Peter Ferola
Name: Peter Ferola
Title: General Counsel & Corporate Secretary

Address for Notice:

500 Seneca Street, Suite 507
Buffalo, NY 14204
Attention:
Fax:
E-mail:

With a copy to (which shall not constitute notice):

Attention:
Fax:
Email:

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK
SIGNATURE PAGE FOR PURCHASER FOLLOWS]

[PURCHASER SIGNATURE PAGE TO 22ND CENTURY GROUP, INC. SECURITIES PURCHASE AGREEMENT]

IN WITNESS WHEREOF, the undersigned have caused this Securities Purchase Agreement to be duly executed by their respective authorized signatories as of the date first indicated above.

Name of Purchaser: JGB Capital, L.P.

Signature of Authorized Signatory of Purchaser: /s/ Brett Cohen

Name of Authorized Signatory: Brett Cohen

Title of Authorized Signatory: President

Email Address of Authorized Signatory:

Address for Notice to Purchaser:

21 Charles St, Suite 160, Westport, CT, 06880

Address for Delivery of Securities to Purchaser (if not same as address for notice):

[●]

Subscription Amount: $1,500,000.00

Principal Amount: $1,578,947.40

[PURCHASER SIGNATURE PAGE TO 22ND CENTURY GROUP, INC. SECURITIES PURCHASE AGREEMENT]

IN WITNESS WHEREOF, the undersigned have caused this Securities Purchase Agreement to be duly executed by their respective authorized signatories as of the date first indicated above.

Name of Purchaser: JGB Partners, L.P.

Signature of Authorized Signatory of Purchaser: /s/ Brett Cohen

Name of Authorized Signatory: Brett Cohen

Title of Authorized Signatory: President

Email Address of Authorized Signatory:

Address for Notice to Purchaser:

21 Charles St, Suite 160, Westport, CT, 06880

Address for Delivery of Securities to Purchaser (if not same as address for notice):

[●]

Subscription Amount: $11,500,000.00

Principal Amount: $12,105,263.40

[PURCHASER SIGNATURE PAGE TO 22ND CENTURY GROUP, INC. SECURITIES PURCHASE AGREEMENT]

IN WITNESS WHEREOF, the undersigned have caused this Securities Purchase Agreement to be duly executed by their respective authorized signatories as of the date first indicated above.

Name of Purchaser: JGB Capital Offshore Ltd.

Signature of Authorized Signatory of Purchaser: /s/ Brett Cohen

Name of Authorized Signatory: Brett Cohen

Title of Authorized Signatory: President

Email Address of Authorized Signatory:

Address for Notice to Purchaser:

21 Charles St, Suite 160, Westport, CT, 06880

Address for Delivery of Securities to Purchaser (if not same as address for notice):

[●]

Subscription Amount: $7,000,000.00

Principal Amount: $7,368,421.20

Exhibit 10.19

NOTWITHSTANDING ANYTHING HEREIN TO THE CONTRARY, THIS NOTE, AND THE INDEBTEDNESS EVIDENCED HEREBY, ARE AND SHALL AT ALL TIMES BE AND REMAIN SUBJECT TO THE TERMS OF THAT CERTAIN SUBORDINATION AGREEMENT, DATED AS OF THE DATE HEREOF (THE "SUBORDINATION AGREEMENT"), AMONG THE COMPANY, HOLDER AND JGB COLLATERAL, LLC. IN THE EVENT OF ANY CONFLICT BETWEEN THE TERMS OF THE SUBORDINATION AGREEMENT AND THIS NOTE, THE TERMS OF THE SUBORDINATION AGREEMENT SHALL GOVERN AND CONTROL.

THESE SECURITIES HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, OR APPLICABLE STATE SECURITIES LAWS. THESE SECURITIES MAY NOT BE OFFERED FOR SALE, SOLD, TRANSFERRED OR ASSIGNED (I) IN THE ABSENCE OF (A) AN EFFECTIVE REGISTRATION STATEMENT FOR THE SECURITIES UNDER THE SECURITIES ACT OF 1933, AS AMENDED, OR (B) AN OPINION OF COUNSEL TO THE HOLDER (IF REQUESTED BY THE COMPANY), IN A FORM REASONABLY ACCEPTABLE TO THE COMPANY, THAT REGISTRATION IS NOT REQUIRED UNDER SAID ACT OR (II) UNLESS SOLD OR ELIGIBLE TO BE SOLD PURSUANT TO RULE 144 OR RULE 144A UNDER SAID ACT. NOTWITHSTANDING THE FOREGOING, THE SECURITIES MAY BE PLEDGED IN CONNECTION WITH A BONA FIDE MARGIN ACCOUNT OR OTHER LOAN OR FINANCING ARRANGEMENT SECURED BY THE SECURITIES.

22nd CENTURY GROUP, INC.

Subordinated Promissory Note

Issuance Date: March 3, 2023 Principal Amount: U.S. $2,864,767
No. 1

FOR VALUE RECEIVED, 22nd CENTURY GROUP, INC., a Nevada corporation (the "**Company**"), hereby promises to pay to the order of Omnia Capital LP or its registered assigns ("**Holder**") the amount set out above as the Principal Amount (together with all PIK Interest paid-in-kind and added to the outstanding principal amount of this Subordinated Promissory Note (this "**Note**") pursuant to Section 1(b), collectively, the "**Principal**") when due, whether upon the Maturity Date (as defined below), acceleration, prepayment or otherwise (in each case in accordance with the terms hereof), to pay paid-in-kind interest ("**PIK Interest**") on the outstanding Principal at the PIK Interest Rate (as defined below) from the date set out above as the Issuance Date (the "**Issuance Date**") until the same is paid in full, whether upon the Maturity Date or acceleration, prepayment or otherwise (in each case in accordance with the terms hereof). As more fully set forth in Section 19, this Note is being issued by the Company to Holder in repayment in full of all of the outstanding indebtedness of the Company to Holder under the Repaid Notes (as defined below).

1. PIK INTEREST.

(a) Accrual. PIK Interest on this Note shall accrue at a rate equal to twenty six and one-half percent (26.50%) simple interest per annum compounded monthly. PIK Interest due on this Note shall be computed on the basis of a three hundred sixty-five (365)-day year.

(b) Payment of PIK Interest. The Company shall pay accrued and unpaid PIK Interest to the Holder on the last day of each calendar month (each such date, a "**PIK Interest Payment Date**") by capitalizing such PIK Interest on such PIK Interest Payment Date and adding it to (and thereby increasing) the outstanding Principal of this Note (as increased by any prior payments of PIK Interest), and thereafter all such PIK Interest shall be treated in all respects as outstanding Principal under this Note. No additional Notes shall be issued to evidence such PIK Interest. If any PIK Interest Payment Date is not a Business Day, then the applicable payment shall be due on the next succeeding Business Day.

2. NO OPTIONAL PREPAYMENT OR REDEMPTION. The Company shall not be permitted to prepay all or any portion of the outstanding Principal of this Note, or make any optional redemption of all or any portion of this Note, at any time prior to the Maturity Date.

3. RIGHTS UPON EVENT OF DEFAULT.

(a) Event of Default. Each of the following events shall constitute an "**Event of Default**":

(i) the Company's failure to perform or observe any covenant or agreement set forth in this Note in any material respect or its failure to pay to the Holder any amount of Principal or PIK Interest when and as due under this Note, but only if such failure remains uncured for a period of at least five (5) days;

(ii) other than as specifically set forth in another clause of this Section 3(a), the Company breaches any material representation, warranty, covenant or other term or condition of this Note, except, in the case of a breach of a covenant or other term or condition that is curable, only if such breach remains uncured for a period of thirty (30) days after actual knowledge of the Company of such breach;

(iii) liquidation proceedings shall be instituted by or against the Company and, if instituted against the Company by a third party, shall not be dismissed within sixty (60) days of their initiation;

(iv) bankruptcy, insolvency, reorganization or other proceedings for the relief of debtors shall be instituted against the Company and shall not be dismissed within sixty (60) days of their initiation;

(v) the commencement by the Company of a voluntary case or proceeding under any applicable federal, state or foreign bankruptcy, insolvency, reorganization or other similar law or the consent by it to the entry of a decree, order, judgment or other similar document in respect of the Company in an involuntary case or proceeding under any applicable federal, state or foreign bankruptcy, insolvency, reorganization or other similar law or to the commencement of any bankruptcy or insolvency case or proceeding against it, or the filing by it of a petition or answer or consent seeking reorganization or relief under any applicable federal, state or foreign law, or the consent by it to the filing of such petition or to the appointment of or taking possession by a custodian, receiver, liquidator, assignee, trustee, sequestrator or other similar official of the Company or of any substantial part of its property, or the making by it of an assignment for the benefit of creditors, or the execution of a composition of debts, or the occurrence of any other similar federal, state or foreign proceeding, or the admission by it in writing of its inability to pay its debts generally as they become due, the taking of corporate action by the Company in furtherance of any such action;

(vi) the entry by a court of (i) a decree, order, judgment or other similar document in respect of the Company of a voluntary or involuntary case or proceeding under any applicable federal, state or foreign bankruptcy, insolvency, reorganization or other similar law; or (ii) a decree, order, judgment or other similar document adjudging the Company as bankrupt or insolvent, or approving as properly filed a petition seeking liquidation, reorganization, arrangement, adjustment or composition of or in respect of the Company under any applicable federal, state or foreign law; or (iii) a decree, order, judgment or other similar document appointing a custodian, receiver, liquidator, assignee, trustee, sequestrator or other similar official of the Company or of any substantial part of its property, or ordering the winding up or liquidation of its affairs, and the continuance of any such decree, order, judgment or other similar document or any such other decree, order, judgment or other similar document unstayed and in effect for a period of sixty (60) consecutive days;

(vii) a final judgment or judgments for the payment of money aggregating in excess of $500,000 are rendered against the Company and which judgments are not, within sixty (60) days after the entry thereof, bonded, discharged or stayed pending appeal, or are not discharged within sixty (60) days after the expiration of such stay;

(viii) the Company fails to pay, when due, or within any applicable grace period, any payment with respect to any Indebtedness in excess of $500,000 due to any third party (other than, with respect to unsecured Indebtedness only, payments contested by the Company in good faith by proper proceedings and with respect to which adequate reserves have been set aside for the payment thereof in accordance with GAAP) or is otherwise in breach or violation of any agreement for monies owed or owing in an amount in excess of $250,000, which breach or violation permits the other party thereto to declare a default or otherwise accelerate amounts due thereunder; or

(ix) any Event of Default occurs under the Senior Loan Documents (as defined in the Subordination Agreement).

(b) Notice of an Event of Default. Upon the occurrence of (i) an Event of Default with respect to this Note, and (ii) any Event of Default occurs under the Senior Loan Documents (as defined in the Subordination Agreement), the Company shall within two (2) Business Days deliver written notice thereof via facsimile and overnight courier (with next day delivery specified) (an "**Event of Default Notice**") to the Holder. Subject to the terms of the Subordination Agreement, at any time after the earlier of the Holder's receipt of an Event of Default Notice and the Holder becoming aware of an Event of Default, the Holder may, by notice to the Company, declare this Note to be forthwith due and payable, whereupon the Principal and all accrued and unpaid PIK Interest thereon, plus all costs of enforcement and collection (including court costs and reasonable attorney's fees), shall immediately become and be forthwith due and payable, without presentment, demand, protest or further notice of any kind, all of which are hereby expressly waived by the Company. No course of dealing on the part of the Holder nor any delay or failure on the part of the Holder to exercise any right shall operate as waiver of such right or otherwise prejudice such Holder's rights, power and remedies.

4. COVENANTS. Until all of the Notes have been satisfied in accordance with their terms, the Company shall send to the Holder (i) annual unaudited financial statements and, upon request no more than annually, an up-to-date capitalization table; and (ii) quarterly unaudited financial statements, and other information as determined by the Company.

5. AMENDING THE TERMS OF THIS NOTE. No provision of this Note may be amended other than by an instrument in writing signed by the Company and the Holder. No waiver of any provision

of this Note shall be effective unless it is in writing and signed by an authorized representative of the waiving party.

6. TRANSFER. The Holder understands that: (i) the Notes have not been and are not being registered under the Securities Act of 1933, as amended (the "**Securities Act**"), or any state securities laws, and may not be offered for sale, sold, assigned or transferred unless (A) subsequently registered thereunder, (B) the Holder shall have delivered to the Company (if requested by the Company) an opinion of counsel to such Holder, in a form reasonably acceptable to the Company, to the effect that such Notes to be sold, assigned or transferred may be sold, assigned or transferred pursuant to an exemption from such registration, or (C) such Holder provides the Company with reasonable assurance and documentation as may be requested by the Company or its legal counsel that such securities can be sold, assigned or transferred pursuant to Rule 144 or Rule 144A promulgated under the Securities Act (or a successor rule thereto) (collectively, "**Rule 144**"); (ii) any sale of the Notes made in reliance on Rule 144 may be made only in accordance with the terms of Rule 144, and further, if Rule 144 is not applicable, any resale of such securities under circumstances in which the seller (or the Person through whom the sale is made) may be deemed to be an underwriter (as that term is defined in the Securities Act) may require compliance with some other exemption under the Securities Act or the rules and regulations of the SEC promulgated thereunder; and (iii) neither the Company nor any other Person is under any obligation to register the Notes under the Securities Act or any state securities laws or to comply with the terms and conditions of any exemption thereunder.

7. REISSUANCE OF THIS NOTE.

(a) Transfer. If this Note is to be transferred, the Holder shall surrender this Note to the Company, whereupon the Company will forthwith issue and deliver upon the order of the Holder a new Note (in accordance with Section 7(d)), registered as the Holder may request, representing the outstanding Principal being transferred by the Holder and, if less than the entire outstanding Principal is being transferred, a new Note (in accordance with Section 7(d)) to the Holder representing the outstanding Principal not being transferred.

(b) Lost, Stolen or Mutilated Note. Upon receipt by the Company of evidence reasonably satisfactory to the Company of the loss, theft, destruction or mutilation of this Note (as to which a written certification and the indemnification contemplated below shall suffice as such evidence), and, in the case of loss, theft or destruction, of any indemnification undertaking by the Holder to the Company in customary and reasonable form and, in the case of mutilation, upon surrender and cancellation of this Note, the Company shall execute and deliver to the Holder a new Note (in accordance with Section 7(d)) representing the outstanding Principal.

(c) Note Exchangeable for Different Denominations. This Note is exchangeable, upon the surrender hereof by the Holder at the principal office of the Company, for a new Note or Notes (in accordance with Section 7(d) and in Principal amounts of at least $1,000) representing in the aggregate the outstanding Principal of this Note, and each such new Note will represent such portion of such outstanding Principal as is designated by the Holder at the time of such surrender.

(d) Issuance of New Notes. Whenever the Company is required to issue a new Note pursuant to the terms of this Note, such new Note (i) shall be of like tenor with this Note, (ii) shall represent, as indicated on the face of such new Note, the Principal remaining outstanding (or in the case of a new Note being issued pursuant to Section 7(a) or Section 7(c), the Principal designated by the Holder which, when added to the principal represented by the other new Notes issued in connection with such issuance, does not exceed the Principal remaining outstanding under this Note immediately prior to such issuance of new Notes), (iii) shall have an issuance date, as indicated on the face of such new Note, which is the same as the

Issuance Date of this Note, (iv) shall have the same rights and conditions as this Note, and (v) shall represent accrued and unpaid PIK Interest on the Principal of this Note, from the Issuance Date.

8. REMEDIES, CHARACTERIZATIONS, OTHER OBLIGATIONS, BREACHES AND INJUNCTIVE RELIEF. The remedies provided in this Note shall be cumulative and in addition to all other remedies available under this Note at law or in equity (including a decree of specific performance and/or other injunctive relief); provided, the Holder shall not be entitled to any duplication or multiplication of damages. The Company covenants to the Holder that there shall be no characterization concerning this instrument other than as expressly provided herein. Amounts set forth or provided for herein with respect to payments and the like (and the computation thereof) shall be the amounts to be received by the Holder and shall not, except as expressly provided herein be subject to any other obligation of the Company (or the performance thereof). The Company acknowledges that a breach by it of its obligations hereunder will cause irreparable harm to the Holder and that the remedy at law for any such breach may be inadequate. The Company therefore agrees that, in the event of any such breach or threatened breach, the Holder shall be entitled, in addition to all other available remedies, to an injunction restraining any such breach or any such threatened breach, without the necessity of showing economic loss and without any bond or other security being required. The Company shall provide all information and documentation to the Holder that is reasonably requested by the Holder to enable the Holder to confirm the Company's compliance with the terms and conditions of this Note.

9. PAYMENT OF COLLECTION, ENFORCEMENT AND OTHER COSTS. If (a) this Note is placed in the hands of an attorney for collection or enforcement of the debt evidenced hereby or is collected or enforced through any legal proceeding or the Holder otherwise takes action to collect amounts due under this Note or to enforce the provisions of this Note or (b) there occurs any bankruptcy, reorganization, receivership of the Company or other proceedings affecting Company creditors' rights and involving a claim under this Note, then the Company shall pay the reasonable costs incurred by the Holder for such collection, enforcement or action or in connection with such bankruptcy, reorganization, receivership or other proceeding, including, without limitation, reasonable attorneys' fees and disbursements.

10. CONSTRUCTION; HEADINGS. This Note shall be deemed to be jointly drafted by the Company and the Holder and shall not be construed against any Person as the drafter hereof. The headings of this Note are for convenience of reference and shall not form part of, or affect the interpretation of, this Note.

11. FAILURE OR INDULGENCE NOT WAIVER. No failure or delay on the part of the Holder in the exercise of any power, right or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any such power, right or privilege preclude other or further exercise thereof or of any other right, power or privilege. No waiver shall be effective unless it is in writing and signed by an authorized representative of the waiving party.

12. NOTICES; PAYMENTS.

(a) Notices. Whenever notice is required to be given under this Note, such notice shall be delivered by hand or overnight courier service, mailed by certified or registered mail or sent by email or facsimile as follows:

(i) if to the Company, to:

[_____]
[_____]

[_____]
Facsimile:
Email:

(ii) If to Holder, to:

Omnia Capital LP
555 Bryant Street, Suite 947
Palo Alto CA 94301
Attention: Manar Zarroug

Notices and other communications sent by hand or overnight courier service, or mailed by certified or registered mail, shall be deemed to have been given when received; notices and other communications sent by facsimile or email shall be deemed to have been given when sent (except that, if not given during normal business hours for the recipient, shall be deemed to have been given at the opening of business on the next Business Day for the recipient).

(b) Payments. Whenever any payment of cash is to be made by the Company to any Person pursuant to this Note, unless otherwise expressly set forth herein, such payment shall be made in lawful money of the United States of America by a check drawn on the account of the Company and sent via overnight courier service to such Person at such address as previously provided to the Company in writing, provided that the Holder may elect to receive a payment of cash via wire transfer of immediately available funds by providing the Company with prior written notice setting out such request and the Holder's wire transfer instructions. Whenever any amount expressed to be due by the terms of this Note is due on any day which is not a Business Day, the same shall instead be due on the next succeeding day which is a Business Day.

13. CANCELLATION. After all Principal, accrued PIK Interest and other amounts at any time owed on this Note have been paid, this Note shall automatically be deemed canceled, shall be surrendered promptly, but in any event within ten (10) calendar days, to the Company by the Holder for cancellation and shall not be reissued.

14. WAIVER OF NOTICE. To the extent permitted by law, the Company hereby irrevocably waives demand, notice, presentment, protest and all other demands and notices in connection with the delivery, acceptance, performance, default or enforcement of this Note.

15. GOVERNING LAW. This Note shall be construed and enforced in accordance with, and all questions concerning the construction, validity, interpretation and performance of this Note shall be governed by, the internal laws of the State of New York, without giving effect to any choice of law or conflict of law provision or rule (whether of the State of New York or any other jurisdictions) that would cause the application of the laws of any jurisdictions other than the State of New York. The Company hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in The City of New York, Borough of Manhattan, for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is brought in an inconvenient forum or that the venue of such suit, action or proceeding is improper. Nothing contained herein shall be deemed to limit in any way any right to serve process in any manner permitted by law. In the event that any provision of this Note is invalid or unenforceable under any applicable statute or rule of law, then such provision shall be deemed inoperative to the extent that it may conflict therewith and shall be deemed modified to conform with such statute or rule of law. Any such provision which may prove invalid or unenforceable under any law shall

not affect the validity or enforceability of any other provision of this Note. Nothing contained herein shall be deemed or operate to preclude the Holder from bringing suit or taking other legal action against the Company in any other jurisdiction to collect on the Company's obligations to the Holder, to realize on any collateral or any other security for such obligations, or to enforce a judgment or other court ruling in favor of the Holder. **EACH OF THE PARTIES HERETO HEREBY IRREVOCABLY WAIVES ANY RIGHT SUCH PARTY MAY HAVE TO, AND AGREES NOT TO REQUEST, A JURY TRIAL FOR THE ADJUDICATION OF ANY DISPUTE HEREUNDER OR IN CONNECTION WITH OR ARISING OUT OF THIS NOTE OR ANY TRANSACTION CONTEMPLATED HEREBY.**

16. CERTAIN DEFINITIONS. For purposes of this Note, the following terms shall have the following meanings:

(a) "**Business Day**" means any day other than Saturday, Sunday or other day on which commercial banks in The City of New York are authorized or required by law to remain closed.

(b) "**Maturity Date**" means May 1, 2024.

(c) "**Person**" means an individual, a limited liability company, a partnership, a joint venture, a corporation, a trust, an unincorporated organization, any other entity or a government or any department or agency thereof.

(d) "**PIK Interest Rate**" means twenty six and one-half percent (26.50%) per annum.

(e) "**Repaid Notes**" means, collectively, (i) that certain 12% Secured Promissory Note, dated as of October 29, 2021, issued by the Company to the Holder in the initial principal amount of $1,000,000, and (ii) that certain 12% Secured Promissory Note, dated as of January 14, 2022, issued by the Company to the Holder in the initial principal amount of $1,500,000.

(f) "**SEC**" means the United States Securities and Exchange Commission or the successor thereto.

17. MAXIMUM PAYMENTS. Nothing contained in this Note shall, or shall be deemed to, establish or require the payment of a rate of interest or other charges in excess of the maximum permitted by applicable law. In the event that the rate of interest required to be paid or other charges under this Note exceeds the maximum permitted by such law, any payments in excess of such maximum shall be credited against amounts owed by the Company to the Holder and thus refunded to the Company.

18. SURRENDER OR ACKNOWLEDGEMENT AND CERTIFICATION. Upon payment in full of this Note, Holder shall surrender the original physical copy of this Note for cancellation; alternatively, if the Holder promptly requests in connection with such payment, the Holder may deliver to the Company a signed acknowledgement of payment in full and a certification that the Holder has cancelled or destroyed the Note in a form reasonably acceptable to the Company.

19. REPAID NOTES. This Note is being issued by the Company to Holder in repayment in full of all of the outstanding indebtedness of the Company to Holder under the Repaid Notes. Upon the issuance of this Note to Holder on the Issuance Date, Holder acknowledges and agrees that, effective as of the Issuance Date, (i) all outstanding indebtedness (including, without limitation, for principal, interest and fees) and other obligations of the Company and any of its subsidiaries under or relating to the Repaid Notes or any of the other Transaction Documents (as defined in the Repaid Notes) shall be paid and satisfied in full, (ii) all security interests and other liens in any assets or property of the Company or any of its subsidiaries granted to, held by, or for the benefit of, Holder pursuant to the Transaction Documents (as

defined in the Repaid Notes) as security for such indebtedness shall be irrevocably satisfied, released and discharged, (ii) the Repaid Notes and the other Transaction Documents (as defined in the Repaid Notes) shall terminate and be of no further force or effect, and (d) the Company (or its designees) shall be authorized to file any UCC termination statements necessary in order to effect the release of security interests contemplated by clause (ii) above.

20. EXPENSES: The Borrower agrees to pay all reasonable costs, including but not limited to reasonable attorneys' fees, incurred by the Holder in connection with collecting or enforcing any obligation of the Borrower to the Holder hereunder or legal representation with respect to bankruptcy or insolvency proceedings. The Borrower also agrees to pay the fees and expenses of counsel to the Holder in connection with the negotiation of this Note, the Subordination Agreement and the transactions contemplated hereby and thereby.

IN WITNESS WHEREOF, the Company has caused this Note to be duly executed as of the Issuance Date set out above.

22ND CENTURY GROUP, INC.,
a Nevada corporation

By: /s/ Hugh Kinsman
Hugh Kinsman
Chief Financial Officer

Accepted and agreed:

OMNIA CAPITAL LP

By: Omnia Management LLC,
its general partner

By: /s/ Manar Zarroug
Name: Manar Zarroug
Title: CEO

EXHIBIT 21.1

SUBSIDIARIES OF
22nd CENTURY GROUP, INC.

NAME	STATE OF FORMATION	PERCENTAGE OWNERSHIP
22nd Century Limited, LLC	Delaware	100%
Goodrich Tobacco Company, LLC	Delaware	100%
Heracles Pharmaceuticals, LLC	Delaware	100%
NASCO Products, LLC	North Carolina	100%
Botanical Genetics, LLC	Delaware	100%
22nd Century Group Europe B.V.	Amsterdam	100%
22nd Century Group Canada, Inc.	Canada	100%
22nd Century Holdings, LLC	Delaware	100%
Golden Acquisition Sub, LLC	Delaware	100%
ESI Holdings, LLC	Nevada	100%
PTB Investment Holdings, LLC	Nevada	100%
GV Farm Services, LLC	Oregon	100%
Evergreen State Holdings, LLC	Oregon	100%
Oregon Custom Supply, LLC	Oregon	100%
Central Oregon Processing, LLC	Oregon	100%
Prineville Solutions, LLC	Oregon	100%
GVBiopharma UK Ltd.	England and Wales	100%
RX Pharmatech Ltd.	England and Wales	100%
GV Property Development, LLC	Oregon	20%
Moonstruck Nevada	Nevada	49%

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement Numbers 333-256616, 333-173166, 333-195380, 333-217771 and 333-231262 on Form S-8 and in Registration Statement Numbers 333-239981 and 333-267266 on Form S-3 of 22nd Century Group, Inc. of our report, dated March 9, 2023**,** appearing in this Annual Report on Form 10-K of 22nd Century Group, Inc.

/s/ Freed Maxick CPAs, P.C.

Buffalo, NY
March 9, 2023

EXHIBIT 31.1

CERTIFICATIONS

I, James A. Mish, Chief Executive Officer of 22nd CENTURY GROUP, INC., certify that:

1. I have reviewed this annual report on Form 10-K of 22nd CENTURY GROUP, INC.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting.

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing equivalent functions):

a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 9, 2023

/s/ James A. Mish
James A. Mish
Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATIONS

I, R. Hugh Kinsman, Chief Financial Officer of 22nd CENTURY GROUP, INC., certify that:

1. I have reviewed this annual report on Form 10-K of 22nd CENTURY GROUP, INC.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting.

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing equivalent functions):

a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 9, 2023

/s/ R. Hugh Kinsman
R. Hugh Kinsman
Chief Financial Officer
(Principal Accounting and Financial Officer)

EXHIBIT 32.1

Written Statement of the President and Chief Financial Officer Pursuant to 18 U.S.C. §1350

Solely for the purposes of complying with 18 U.S.C. §1350, I, the undersigned Chief Executive Officer of 22nd CENTURY GROUP, INC. (the "Company"), and I, the undersigned Chief Financial Officer of the Company, hereby certify, to the best of my knowledge, that the annual report on Form 10-K of the Company for the year ended December 31, 2022 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934 and that the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

This certification is being furnished solely to accompany this Report pursuant to 18 U.S.C. 1350, and is not being filed for purposes of Section 18 of the Securities Exchange Act of 1934 and is not to be incorporated by reference into any filing of the registrant, whether made before or after the date hereof, regardless of any general incorporation language in such filing.

Date: March 9, 2023

/s/ James A. Mish
James A. Mish
Chief Executive Officer

Date: March 9, 2023

/s/ R. Hugh Kinsman
R. Hugh Kinsman
Chief Financial Officer