

What is claimed is:

1. A distribution monitoring processor apparatus comprising:

a data storage to store instructions for execution and a first copy of a distributed ledger;

a data communication interface to receive and transmit data;

a radiopharmaceutical material generator;

a material status monitor to track a status of a batch of radiopharmaceutical material, the material status monitor to receive an indication of a type, a quantity, and a timestamp associated with the batch of radiopharmaceutical material via the data communication interface; and

a ledger record processor to generate and update a record in the first copy of the distributed ledger using the indication of type, quantity, and timestamp associated with the batch of radiopharmaceutical material from the material status monitor, the ledger record processor to add a transaction to the record to track when and what quantity of the batch of radiopharmaceutical material is sold and resold.

wherein the material status monitor is to be connected to a generator to trigger the ledger record processor to generate the record when the batch of radiopharmaceutical material is synthesized by the radiopharmaceutical material generator.

2. The apparatus of claim 1, further including a contract generator to generate a smart contract to involve the batch of radiopharmaceutical material and a customer subsystem associated with a first customer, the first customer to receive the batch of radiopharmaceutical material, the smart contract to facilitate requesting, selling, and reselling the batch of

radiopharmaceutical material via the smart contract including reselling of a portion of the batch of radiopharmaceutical material to a second customer.

3. The apparatus of claim 2, wherein the smart contract is to include a function to trigger the radiopharmaceutical material generator to synthesize the batch of radiopharmaceutical material.

4. The apparatus of claim 1, wherein the material status monitor is to track a first use of the batch of radiopharmaceutical material and usable life of a remainder of the batch of radiopharmaceutical material after the first use to update the record in the first copy of the distributed ledger with the ledger record processor to reflect a remaining quantity and usable life of the remainder of the batch of radiopharmaceutical material after the first use via a transaction added to the record.

5. The apparatus of claim 1, wherein the ledger record processor is to communicate an update to the record of the first copy of the distributed ledger to at least one of a remote server or a customer subsystem via the data communication interface.

6. The apparatus of claim 5, wherein the at least one of the remote server or the customer subsystem is to verify the update to the record of the first copy of the distributed ledger.

~~7.——The apparatus of claim 1, wherein the material status monitor is to be connected to a generator to trigger the ledger record processor to generate the record when the batch of radiopharmaceutical material is synthesized by the generator.~~

~~8~~7. The apparatus of claim 1, wherein the batch of radiopharmaceutical material includes radiopharmaceutical material for ~~position~~positron emission tomography.

~~9.——A computer readable storage medium including instructions which, when executed, cause at least one processor to at least:~~

~~track a status of a batch of radiopharmaceutical material, the status to include a type, a quantity, and a timestamp associated with the batch of radiopharmaceutical material;~~

~~generate a record in a first copy of a distributed ledger using the type, quantity, and timestamp associated with the batch of radiopharmaceutical material;~~

~~update the record based on at least one of usage of the batch of radiopharmaceutical material, resale of at least a portion of the batch of radiopharmaceutical material, and decay of the batch of radiopharmaceutical material; and~~

~~share the record with a second copy of the distributed ledger.~~

~~10.——The computer readable storage medium of claim 9, wherein the instructions, when executed, further cause the at least one processor to at least generate a smart contract to involve the batch of radiopharmaceutical material and a customer subsystem associated with a first customer, the first customer to receive the batch of radiopharmaceutical material, the smart contract to facilitate requesting, selling, and reselling the batch of radiopharmaceutical material~~

via the smart contract including reselling of a portion of the batch of radiopharmaceutical material to a second customer.

11.—The computer readable storage medium of claim 9, wherein the smart contract is to include a function to trigger the generator to synthesize the batch of radiopharmaceutical material.

12.—The computer readable storage medium of claim 9, wherein the instructions, when executed, cause the at least one processor to at least track a first use of the batch of radiopharmaceutical material and usable life of a remainder of the batch of radiopharmaceutical material after the first use to update the record in the first copy of the distributed ledger to reflect a remaining quantity and usable life of the remainder of the batch of radiopharmaceutical material after the first use via a transaction added to the record.

13.—The computer readable storage medium of claim 9, wherein the instructions, when executed, cause the at least one processor to at least communicate an update to the record of the first copy of the distributed ledger to at least one of a remote server or a customer subsystem.

14.—The computer readable storage medium of claim 13, wherein the instructions, when executed, cause the at least one processor to at least verify the update to the record based on feedback from at least one of the remote server or the customer subsystem.

~~15.— The computer readable storage medium of claim 9, wherein the instructions, when executed, cause the at least one processor to generate the record when the batch of radiopharmaceutical material is synthesized by a generator in communication with the at least one processor.~~

~~168.~~ A computer-implemented method of managing radiopharmaceutical material, the method comprising:

tracking, using at least one processor, a status of a batch of radiopharmaceutical material, the status to include a type, a quantity, and a timestamp associated with the batch of radiopharmaceutical material;

generating, using the at least one processor, a record in a first copy of a distributed ledger using the type, quantity, and timestamp associated with the batch of radiopharmaceutical material, wherein generating the record comprises generating the record when the batch of radiopharmaceutical material is synthesized by a radiopharmaceutical material generator in communication with the at least one processor;

updating, using the at least one processor, the record based on at least one of usage of the batch of radiopharmaceutical material, resale of at least a portion of the batch of radiopharmaceutical material, and decay of the batch of radiopharmaceutical material; and

sharing, using the at least one processor, the record with a second copy of the distributed ledger.

~~179.~~ The method of claim ~~168~~, further including generating a smart contract to involve the batch of radiopharmaceutical material and a customer subsystem associated with a first

customer, the first customer to receive the batch of radiopharmaceutical material, the smart contract to facilitate requesting, selling, and reselling the batch of radiopharmaceutical material via the smart contract including reselling of a portion of the batch of radiopharmaceutical material to a second customer.

1810. The method of claim 169, further including triggering, via a function of the smart contract, a generator to synthesize the batch of radiopharmaceutical material.

1911. The method of claim 168, further including communicating an update to the record of the first copy of the distributed ledger to at least one of a remote server or a customer subsystem.

2012. The method of claim 168, wherein tracking the status of the batch of radiopharmaceutical material includes tracking a first use of the batch of radiopharmaceutical material and usable life of a remainder of the batch of radiopharmaceutical material after the first use to update the record in the first copy of the distributed ledger to reflect a remaining quantity and usable life of the remainder of the batch of radiopharmaceutical material after the first use via a transaction added to the record.

13. A computer-readable storage medium including instructions which, when executed, cause at least one processor to at least carry out the method of any of claims 8 to 12.

14. The computer-readable storage medium of claim 13, wherein the instructions, when executed, cause the at least one processor to carry out the method of claim 11, and wherein the instructions, when executed, further cause the at least one processor to at least verify the update to the record based on feedback from at least one of the remote server or the customer subsystem.