As the sputtered atoms from the cathode 105 collide with the gas in the inner environment 102, they are excited to higher energy levels. As the sputtered atoms decay from these higher energy levels, photons are emitted through the tube end 104 and into the chemical substance under analysis. The photons emitted due to the decay of the atoms have a unique spectral line density, which enables detection of a particular metal and its characteristics when the photons strike the chemical substance under investigation.

The anode 106 of the HCL 100 has a finite life, thus it is of interest to track and monitor the usage of the HCL 100. One way in which the usage of the HCL 100 can be tracked is with a mercury elapsed time meter. However, because of the toxicity of mercury, a need exists for monitoring usage of the HCL 100 with the use of time meters that do not use mercury. An alternative way to keep track of usage for the HCL 100, without using mercury, is in an external computing device (not shown) that monitors usage information of the HCL 100. For example, the computing device may keep track of when the HCL 100 is turned on and off. The amount of time that power is supplied to the HCL 100 is recorded and logged. The computing device may be accessed at any point to retrieve the usage information for the HCL 100.

Using an external computing device to monitor usage information for the HCL 100 does not account for usage of the HCL 100 in more than one atomic absorption spectrometer, however. Typically, different HCLs, such as the HCL 100, are used interchangeably in different atomic absorption spectrometers. Thus, the computing system may not record an accurate representation of the usage for each HCL, such as the HCL 100. Not knowing the accurate usage of the HCL 100 is undesirable from an operational perspective because the HCL 100 may burnout unexpectedly, or may ~~be~~ operate less effectively than a newer HCL.

According to one embodiment as shown in Figure 2, an HCL monitoring system 200 causes usage information to be stored in an HCL 201, similar to the HCL 100, so that any atomic absorption spectrometer may access the most up-to-date usage information for the HCL 201. The HCL monitoring system 200 allows the HCL 201 to be used in any compatible atomic absorption

one or more memory storage sections coupled to the one or more hollow cathode lamps, the one or more memory storage sections capable of communicating data including a type of a respective hollow cathode lamp and hollow cathode lamp metric data.

10. The system of claim 9, wherein the data is communicated to a computing device that is located at a separate location from the one or more memory storage sections.

11 . The system of claim 9, wherein the one or more memory storage sections are located in one or more end caps of the one or more hollow cathode lamps.

12. The system of claim 9, wherein the data storage device is an Electrical Erasable Programmable Read-Only Memory (EEPROM).

13. The system of claim 9, wherein the hollow cathode lamp metric data includes an amount of time a respective hollow cathode lamp has been in use.

14. A method comprising:

activating a power supply to at least one hollow cathode lamp; and communicating data stored in a memory device located in the at least one hollow cathode lamp to a computing device, the data including usage

information corresponding to an amount of time the at least one hollow cathode lamp has been used.

15. The method of claim 14, further comprising:

determining at fixed intervals of time that the at least one hollow cathode lamp is correctly inserted into an analyzer; and

causing a display to be generated that lists the at least one hollow cathode lamp and the usage information.

16. The method of claim 15, wherein the display further lists a type of the at least one hollow cathode lamp and a current that flows into the at least one hollow cathode lamp.

17. The method of claim 14, wherein the memory device is an Electrical Erasable Programmable Read-Only Memory (EEPROM).

18. The method of claim 14, wherein the usage information is measured in a unit of current multiplied by time.

As the sputtered atoms from the cathode 105 collide with the gas in the inner environment 102, they are excited to higher energy levels. As the sputtered atoms decay from these higher energy levels, photons are emitted through the tube end 104 and into the chemical substance under analysis. The photons emitted due to the decay of the atoms have a unique spectral line density, which enables detection of a particular metal and its characteristics when the photons strike the chemical substance under investigation.

The anode 106 of the HCL 100 has a finite life, thus it is of interest to track and monitor the usage of the HCL 100. One way in which the usage of the HCL 100 can be tracked is with a mercury elapsed time meter. However, because of the toxicity of mercury, a need exists for monitoring usage of the HCL 100 with the use of time meters that do not use mercury. An alternative way to keep track of usage for the HCL 100, without using mercury, is in an external computing device (not shown) that monitors usage information of the HCL 100. For example, the computing device may keep track of when the HCL 100 is turned on and off. The amount of time that power is supplied to the HCL 100 is recorded and logged. The computing device may be accessed at any point to retrieve the usage information for the HCL 100.

Using an external computing device to monitor usage information for the HCL 100 does not account for usage of the HCL 100 in more than one atomic absorption spectrometer, however. Typically, different HCLs, such as the HCL 100, are used interchangeably in different atomic absorption spectrometers. Thus, the computing system may not record an accurate representation of the usage for each HCL, such as the HCL 100. Not knowing the accurate usage of the HCL 100 is undesirable from an operational perspective because the HCL 100 may burnout unexpectedly, or may operate less effectively than a newer HCL.

According to one embodiment as shown in Figure 2, an HCL monitoring system 200 causes usage information to be stored in an HCL 201, similar to the HCL 100, so that any atomic absorption spectrometer may access the most up-to-date usage information for the HCL 201. The HCL monitoring system 200 allows the HCL 201 to be used in any compatible atomic absorption

one or more memory storage sections coupled to the one or more hollow cathode lamps, the one or more memory storage sections capable of communicating data including a type of a respective hollow cathode lamp and hollow cathode lamp metric data.

10. The system of claim 9, wherein the data is communicated to a computing device that is located at a separate location from the one or more memory storage sections.

11 . The system of claim 9, wherein the one or more memory storage sections are located in one or more end caps of the one or more hollow cathode lamps.

12. The system of claim 9, wherein the data storage device is an Electrical Erasable Programmable Read-Only Memory (EEPROM).

13. The system of claim 9, wherein the hollow cathode lamp metric data includes an amount of time a respective hollow cathode lamp has been in use.

14. A method comprising:

activating a power supply to at least one hollow cathode lamp; and communicating data stored in a memory device located in the at least one hollow cathode lamp to a computing device, the data including usage

information corresponding to an amount of time the at least one hollow cathode lamp has been used.

15. The method of claim 14, further comprising:

determining at fixed intervals of time that the at least one hollow cathode lamp is correctly inserted into an analyzer; and

causing a display to be generated that lists the at least one hollow cathode lamp and the usage information.

16. The method of claim 15, wherein the display further lists a type of the at least one hollow cathode lamp and a current that flows into the at least one hollow cathode lamp.

17. The method of claim 14, wherein the memory device is an Electrical Erasable Programmable Read-Only Memory (EEPROM).

18. The method of claim 14, wherein the usage information is measured in a unit of current multiplied by time.