Appendix A: Occupational Noise Standard
Departmental Contacts

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1.0 Introduction

The Federal Occupational Safety and Health Administration (OSHA) promulgated a noise standard in 1974 and published a Hearing Conservation Amendment to this standard in 1983. The current Arizona requirements are based on regulations promulgated by the Federal Standard. The OSHA standard provides worker protection against the effects of noise exposure when sound levels exceed a time-weighted average level of 85 decibels over an 8-hour workday, or for higher levels of noise exposure over shorter periods (see Table I). If noise monitoring identifies workers who are exposed to these levels, the employer must institute a continuing, effective Hearing Conservation Program (HCP).

**TABLE 1 – Permissible Noise Exposures**

<table>
<thead>
<tr>
<th>Duration per day, hours</th>
<th>Sound level dBA, slow response</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0</td>
<td>90</td>
</tr>
<tr>
<td>6.0</td>
<td>92</td>
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<td>4.0</td>
<td>95</td>
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<td>3.0</td>
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<tr>
<td>1.5</td>
<td>102</td>
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<tr>
<td>1.0</td>
<td>105</td>
</tr>
<tr>
<td>0.5</td>
<td>110</td>
</tr>
<tr>
<td>0.25 or less</td>
<td>115</td>
</tr>
</tbody>
</table>

2.0 Program Components

2.1 Monitoring

Noise analysis (a sound level survey) is conducted whenever:

- there is knowledge or a suspicion that noise levels exceed 85 dB (A weighted) on an 8-hour time-weighted-average (TWA), or
- Employees have shorter periods of exposure to higher levels of noise (see Table I).

A combination of noise dosimetry, integrated sound level meter field measures, and direct employee noise exposure interviews will be implemented for a sensitive noise evaluation on campus in order to identify the employees who need to be enrolled in the HCP. Furthermore, noise monitoring shall be repeated when any production, equipment or administrative changes occur which might alter the noise exposure of any employee. When levels that exceed 85 db (A) TWA are found, all reasonable efforts will be made to use administrative and/or engineering controls to reduce exposure.
2.2 Audiometric Testing

Audiometric testing will be conducted on all employees (without cost to the employee) who:

- are exposed to levels which equal or exceed 85 dB (A) TWA,
- or
- have shorter periods of exposure to higher levels of noise (see Table 1).

An initial baseline audiogram will be obtained and subsequent annual audiograms will be compared to the baseline to ascertain if a significant threshold shift has occurred. All baseline and annual testing will be performed by an audiologist or his or her competent designate under the direct supervision of a certified audiologist. OSHA Amendment guidelines for testing procedures, equipment and calibration requirements will be followed. (See Section 4.0 for information on testing facilities.)

2.3 Hearing Protection

All employees exposed to 85dB (A) TWA noise must have available hearing protectors. This will usually be an approved type of ear plug, muff, canal cup, or glass down fiber designed to obstruct sound energy from entering the ear canals.

It is the supervisor's responsibility to ensure such hearing protectors are worn by employees:

- whose noise exposure exceeds 90dB (A) TWA; or
- whose exposure equals or exceeds 85dB(A) TWA and have not yet had a baseline evaluation;
  or
- who have experienced a Standard Threshold Shift (STS)
- who have shorter periods of exposure to higher levels of noise (see Table 1).

The adequacy of hearing protector attenuation shall be reevaluated whenever noise exposure increase.

2.4 Standard Posting

Per the Occupational Noise Exposure Standard, NAU must post a paper copy of the standard and post it in a readily accessible area of the affected employee’s workplace. A copy of the standard has been provided in Appendix A of this manual.

2.5 Employee Training

An educational program will be instituted for all employees:

- whose noise exposure exceeds 85dB(A) TWA, or
- who have shorter periods of exposure to higher levels of noise (see Table 1).
This program will cover specific topics outlined in the OSHA document and be repeated annually. These specific topics include the following:

- The effects of noise on hearing.
- The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use and care.
- The purpose of audiometric testing and an explanation of test procedures.

3.0 Documentation and Record Keeping

This system requirement includes employee annual hearing test data (test documentation should include the date, place, test equipment serial number; date of calibration; and specific examiner certification information); employee damage risk category; annual certification of test room performance; annual electro-acoustic calibration of test instrumentation (both audiometers and noise measurement equipment), and daily biological calibration of audiometers. Adjustments or revisions to recorded hearing data are solely the responsibility of an audiologist or qualified physician; all hard copy documentation of hearing testing may serve as medico-legal evidence in cases of workman’s compensation. Records of exposure measurements and audiometric testing will be maintained at NAU Speech and Hearing Clinic and on a departmental level.

4.0 Departmental Responsibilities

Based on the OSHA requirements as described above the following areas of responsibility are designated:

Office of Regulatory Compliance (ORC):

The ORC is responsible for the overall coordination and implementation of the HCP. This includes:

- Providing regulatory guidance and assistance in compliance with OSHA regulations.
- Coordinating efforts to reduce hazardous noise by engineering and/or administrative controls where feasible.
- Providing departmental supervisors with a copy of the Occupational Noise Standard, which is to be posted in the workplace as required by the standard (see Appendix A).
- Conducting a comprehensive noise survey for identification of employees to be included in the program. The ORC will follow the recommendation made by the National Institutes for Occupational Safety and Health (NIOSH) to conduct noise surveillance on employees using noise dosimeter and integrated sound level meters in two-year intervals.
- Provision of noise surveys on a requested or as needed basis.
- Provision of an annual training program, and
Oversight of a worker training records when applicable.

**NAU Speech and Hearing Clinic** is responsible for audiometric testing of employees, and for record keeping and notification regarding these tests. This includes:

- completion of hearing evaluations on all employees exposed to 85dBA noise levels for both baseline and annual testing;
- hearing conservation consultations either on an individual or group basis;
- record maintenance and notifications

Record keeping includes sound level surveys, hearing test data, and required employee and employer notification. Results of testing will be provided to the employee.

**ORC** is responsible for notifying the supervisors of departments with employees who are currently in the HCP of the annual hearing test requirement. The Director of those affected departments is responsible for delegating an individual within the department to act as a liaison with NAU Speech and Hearing Clinic to arrange for testing and training with the employee's unit.

NAU Speech and Hearing is responsible for the maintenance of employee health records and will include hearing test data as it is collected. NAU Human Resources is also responsible for required OSHA notifications based on hearing loss as a reportable disease.

**Departments:**

NAU Departments are responsible for compliance with NAU's HCP within their area of responsibility. It is expected that each Department will appoint a contact person to serve as a liaison with the ORC and NAU Speech and Hearing Clinic to coordinate sound level surveys, annual hearing testing and training efforts. The Department must identify that appointed person for ease of communication and scheduling. The Department is also responsible for providing affected employees or their representatives with access to a copy of the Occupational Noise Standard, as well as posting a copy in their workplace (see Appendix A). The Department must provide the ORC with a list of personnel who are exposed to hazardous noise areas (as identified by previous noise surveys). It is also each Department’s responsibility to evaluate programs, processes and jobs and notify the ORC of possible noise hazards that require a survey.

**First line supervisors:**

It is the direct responsibility of an employee's first line supervisor to ensure appropriate safety measures are followed. This includes enforcement of hearing protector use where required and accommodation with hearing test requirements.
Employee:

Safety is each individual's responsibility. Use of hearing protection where indicated is first and foremost the individual employee's concern. It is also incumbent on each employee to appear for required hearing evaluations, follow instructions regarding noise exposure prior to testing and participate in annual training as directed.

5.0 Program Costs

NAU Departments are responsible for costs related to services from NAU Speech and Hearing. Departments are also responsible for costs related to hearing protection.
Appendix A: Occupational Noise Standard
1910.95(a)
Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

![Figure G-9](image-url)
Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1.G-16.

1910.95(b)(1)

When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

1910.95(b)(2)

If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

<table>
<thead>
<tr>
<th>TABLE G-16 - PERMISSIBLE NOISE EXPOSURES (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration per day, hours</td>
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<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
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<tr>
<td>1</td>
</tr>
<tr>
<td>1/2</td>
</tr>
<tr>
<td>1/4 or less</td>
</tr>
</tbody>
</table>

Footnote(1) When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C(1)/T(1) + C(2)/T(2) C(n)/T(n) exceeds unity, then, the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

1910.95(c)

"Hearing conservation program."

1910.95(c)(1)

The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

1910.95(c)(2)
For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

**1910.95(d)**

"Monitoring."

**1910.95(d)(1)**

When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

**1910.95(d)(1)(i)**

The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

**1910.95(d)(1)(ii)**

Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

**1910.95(d)(2)(i)**

All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

**1910.95(d)(2)(ii)**

Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

**1910.95(d)(3)**

Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

**1910.95(d)(3)(i)**

Additional employees may be exposed at or above the action level; or

**1910.95(d)(3)(ii)**

The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

**1910.95(e)**

"Employee notification." The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

**1910.95(f)**

"Observation of monitoring." The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

**1910.95(g)**

"Audiometric testing program."

**1910.95(g)(1)**

The employer shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

**1910.95(g)(2)**

The program shall be provided at no cost to employees.
1910.95(g)(3)
Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining and checking calibration and proper functioning of the audiometers being used. A technician who operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

1910.95(g)(4)
All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: "Audiometric Measuring Instruments."

1910.95(g)(5)
"Baseline audiogram."

1910.95(g)(5)(i)
Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

1910.95(g)(5)(ii)
"Mobile test van exception." Where mobile test vans are used to meet the audiometric testing obligation, the employer shall obtain a valid baseline audiogram within 1 year of an employee's first exposure at or above the action level. Where baseline audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees shall wear hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

1910.95(g)(5)(iii)
Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

1910.95(g)(5)(iv)
The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

1910.95(g)(6)
"Annual audiogram." At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

1910.95(g)(7)
"Evaluation of audiogram."

1910.95(g)(7)(i)
Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift as defined in paragraph (g)(10) of this section has occurred. This comparison may be done by a technician.

1910.95(g)(7)(ii)
If the annual audiogram shows that an employee has suffered a standard threshold shift, the
employer may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

1910.95(g)(7)(iii)
The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

1910.95(g)(7)(iii)(A)
A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

1910.95(g)(7)(iii)(B)
The baseline audiogram and most recent audiogram of the employee to be evaluated;

1910.95(g)(7)(iii)(C)
Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

1910.95(g)(7)(iii)(D)
Records of audiometer calibrations required by paragraph (h)(5) of this section.

1910.95(g)(8)
"Follow-up procedures."

1910.95(g)(8)(i)
If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination.

1910.95(g)(8)(ii)
Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

1910.95(g)(8)(ii)(A)
Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

1910.95(g)(8)(ii)(B)
Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

1910.95(g)(8)(ii)(C)
The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

1910.95(g)(8)(ii)(D)
The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

1910.95(g)(8)(iii)
If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

1910.95(g)(8)(iii)(A)
Shall inform the employee of the new audiometric interpretation; and
May discontinue the required use of hearing protectors for that employee.

"Revised baseline." An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the audiogram:

The standard threshold shift revealed by the audiogram is persistent; or

The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

"Standard threshold shift."

As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in Appendix F: "Calculation and Application of Age Correction to Audiograms."

"Audiometric test requirements."

Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969, which is incorporated by reference as specified in Sec. 1910.6.

Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: "Audiometric Measuring Instruments."

Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: "Audiometric Test Rooms."

"Audiometer calibration."

The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.
1910.95(h)(5)(ii)
Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: "Acoustic Calibration of Audiometers." Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

1910.95(h)(5)(iii)
An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3.; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

1910.95(i)
"Hearing protectors."

1910.95(i)(1)
Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

1910.95(i)(2)
Employers shall ensure that hearing protectors are worn:

1910.95(i)(2)(i)
By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

1910.95(i)(2)(ii)
By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

1910.95(i)(2)(ii)(A)
Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

1910.95(i)(2)(ii)(B)
Has experienced a standard threshold shift.

1910.95(i)(3)
Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

1910.95(i)(4)
The employer shall provide training in the use and care of all hearing protectors provided to employees.

1910.95(i)(5)
The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

1910.95(j)
"Hearing protector attenuation."

1910.95(j)(1)
The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in Appendix B: "Methods for Estimating the Adequacy of Hearing Protection Attenuation."

1910.95(j)(2)
Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted
average of 90 decibels as required by paragraph (b) of this section.

1910.95(j)(3)
For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

1910.95(j)(4)
The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

1910.95(k)
"Training program."

1910.95(k)(1)
The employer shall train each employee who is exposed to noise at or above an 8-hour time weighted average of 85 decibels in accordance with the requirements of this section. The employer shall institute a training program and ensure employee participation in the program.

1910.95(k)(2)
The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

1910.95(k)(3)
The employer shall ensure that each employee is informed of the following:

1910.95(k)(3)(i)
The effects of noise on hearing;

1910.95(k)(3)(ii)
The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and

1910.95(k)(3)(iii)
The purpose of audiometric testing, and an explanation of the test procedures.

1910.95(l)
"Access to information and training materials."

1910.95(l)(1)
The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

1910.95(l)(2)
The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

1910.95(l)(3)
The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

1910.95(m)
"Recordkeeping" -

1910.95(m)(1)
"Exposure measurements." The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

1910.95(m)(2)
"Audiometric tests."
The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

This record shall include:

- Name and job classification of the employee;
- Date of the audiogram;
- The examiner's name;
- Date of the last acoustic or exhaustive calibration of the audiometer; and
- Employee's most recent noise exposure assessment.

The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

"Record retention." The employer shall retain records required in this paragraph (m) for at least the following periods.

- Noise exposure measurement records shall be retained for two years.
- Audiometric test records shall be retained for the duration of the affected employee's employment.

"Access to records." All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.1020 (a)-(e) and (g)-

apply to access to records under this section.

"Transfer of records." If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m)(3) of this section.

"Appendices." Appendices A, B, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

Appendices F and G to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

"
"Exemptions." Paragraphs (c) through (n) of this section shall not apply to employers engaged in oil and gas well drilling and servicing operations.