

NDT Inspection Planning Checklist

A step-by-step planning guide for turnarounds, in-service inspections, and new construction NDT campaigns

- ✓ Pre-inspection planning checklist (scope, code, access, safety)
- ✓ Method selection decision tree by defect type
- ✓ Turnaround and shutdown inspection workflow
- ✓ Documentation and deliverables requirements



Pre-Inspection Planning Checklist

Scope Definition

- Identify all components / welds requiring inspection (equipment list or isometric drawings)
- Determine governing code (ASME, API, AWS, DOT/PHMSA, NAS)
- Specify acceptance criteria (code section and edition year)
- Determine NDT method(s) required by code or engineering assessment
- Define inspection coverage (100%, spot, or sampling plan per code)
- Identify any previous inspection history and baseline data

Personnel & Certification Requirements

- Confirm required certification standard (SNT-TC-1A, CP-189, NAS 410)
- Specify minimum certification level (Level I with Level II oversight, or Level II minimum)
- Confirm Level III availability for procedure review and interpretation support
- Verify technician certifications are current (within 5-year renewal cycle)
- Confirm annual vision exam documentation is current

Equipment & Calibration

- Confirm all NDT equipment is calibrated and certificates are current
- Verify equipment capability matches inspection requirements (frequency, probe selection, source strength)
- Ensure backup equipment is available on-site for multi-day campaigns
- Confirm all calibration standards and reference blocks are available

Site Access & Preparation

- Scaffolding / access platforms erected and inspected
- Insulation removed from inspection areas
- Surfaces cleaned to inspection-ready condition (wire brush minimum for MT/PT; ground smooth for UT)
- Confined space entry permits arranged (if applicable)
- Hot work permits coordinated (if applicable)
- Radiation safety exclusion zones planned (for RT work)
- Other trades cleared from inspection area during RT

Critical

Surface preparation is the #1 cause of inspection delays and cost overruns. If surfaces aren't clean when the NDT crew arrives, you're paying standby time at \$50-\$100/hr while someone scrambles to find a grinder.

NDT Method Selection Guide

Which NDT Method Do You Need?

Decision matrix by defect type and material

Defect Type	Location	Material	Recommended Method(s)	Code Reference
Surface cracks	Surface-breaking	Ferromagnetic steel	MT (primary), PT (alternative)	ASME V Article 7 (MT), Article 6 (PT)
Surface cracks	Surface-breaking	Non-ferromagnetic (stainless, aluminum)	PT (primary), ET (alternative)	ASME V Article 6, Article 8
Subsurface flaws	Internal (welds)	Any metal	UT or RT (code-dependent)	ASME V Article 4 (UT), Article 2 (RT)
Volumetric flaws (porosity, slag)	Internal (welds)	Any metal	RT (preferred for volumetric), UT	ASME V Article 2
Lack of fusion / incomplete penetration	Internal (welds)	Any metal	UT (preferred for planar), RT	ASME V Article 4
Corrosion / wall thinning	Through-wall	Carbon steel, alloys	UT thickness measurement	API 570, API 510
Heat exchanger tube flaws	Tube wall	Any tubing	ET (primary), IRIS UT (alternative)	ASME V Article 8
Weld sizing / characterization	Internal (critical welds)	Any metal	TOFD or PAUT	ASME V Article 4
Hydrogen damage / blistering	Subsurface	Carbon steel (refinery)	UT (shear wave), AUBT	API RP 941

When Both UT and RT Are Acceptable

UT is generally faster, cheaper, and avoids radiation safety concerns. RT provides a permanent film record and is better at detecting volumetric defects (porosity, slag). For critical welds where

both methods are code-acceptable, consider using both — UT for planar flaw detection and RT for volumetric verification.



Turnaround / Shutdown Inspection Workflow

Planning NDT for a Plant Turnaround

Timeline flow

Phase 1: Pre-Turnaround

- Review previous inspection reports and identify areas of concern
- Develop inspection work list with equipment IDs, weld numbers, and methods
- Issue RFQ to NDT providers with detailed scope and schedule
- Evaluate proposals and award contract (2-3 weeks before)
- Conduct pre-job meeting with NDT contractor — review scope, safety, access, schedule

Phase 2: Mobilization

- NDT crew arrives on-site, completes safety orientation
- Verify all certifications, equipment calibration, and procedures
- Confirm access, scaffolding, and surface preparation are complete
- Issue work permits and review daily inspection schedule

Phase 3: Execution

- Daily coordination meetings — prioritize inspection sequence based on equipment release schedule
- NDT crews inspect per written procedures — report results in real-time for engineering disposition
- Level III on-call for interpretation disputes and procedure modifications

- Track completion percentage against schedule daily

Phase 4: Post-Turnaround

- Collect all inspection reports, data files, and documentation
- Reconcile inspection work list — confirm 100% of scope completed
- Level III review of any reportable indications or anomalies
- Archive inspection data for next turnaround comparison
- Debrief with NDT contractor — document lessons learned

Start Early

NDT firms in the Gulf Coast book out 2–3 months in advance during spring and fall turnaround seasons (March–May, September–November). Issue your RFQ 12 weeks before the turnaround window opens.



Documentation & Deliverables Requirements

What Your NDT Reports Should Include

Minimum report content per ASME Section V and industry best practice

For Every Inspection Report

- Client name, project ID, and purchase order number
- Equipment / component identification (tag number, drawing reference)
- Weld number or inspection location identifier
- NDT method and technique used
- Governing code, edition, and acceptance criteria
- Equipment used (manufacturer, model, serial number, calibration date)
- Reference standards / calibration blocks used
- Technician name, certification level, and certification number
- Date of inspection
- Results: acceptable / not acceptable / indications found
- Indication details: type, size, location, disposition
- Technician signature and date
- Level III review signature (if required)

Method-Specific Requirements

Method	Additional Documentation
UT	Scan plan, probe details (frequency, angle, size), calibration block ID, DAC/TCG curves, gate settings
RT	Source type and strength, SFD/FFD, exposure time, film/plate ID, IQI type and placement, density readings
MT	Magnetizing method (yoke/prods/coil), field strength verification, particle type (dry/wet/fluorescent), UV intensity
PT	Penetrant type, dwell time, developer type, observation time, temperature
ET	Probe type and frequency, calibration standard, channel setup, phase/amplitude response
PAUT	Focal law file, encoder data, S-scan/L-scan images, calibration record
TOFD	Probe pair details, PCS, calibration record, B-scan images

Safety Planning for RT (Radiographic Testing)

Radiation Safety Checklist for Radiographic Inspections

This section applies any time radiographic testing is performed at your facility.

- Radiation Safety Officer (RSO) identified and on-site during all RT activities
- Current NRC or Agreement State radioactive materials license verified (for gamma radiography)
- X-ray machine registration verified with state radiation control program
- Exclusion zone calculated and posted with barricades, warning signs, and flashing lights
- Survey meter available and calibrated (calibration within 12 months)
- All RT personnel wearing assigned dosimetry (film badge or TLD)
- Pocket dosimeters (direct-reading) issued and checked before each shift
- Emergency procedures posted and reviewed with all RT personnel
- Emergency contact numbers for RSO and radiation emergency services posted
- All non-RT personnel cleared from exclusion zone before exposure
- Post-exposure radiation survey completed before exclusion zone is released
- Daily exposure logs maintained and reviewed by RSO

Regulatory Risk

Operating without proper NRC/state licensing, failing to post exclusion zones, or allowing dosimetry lapses can result in NRC enforcement action, fines (\$100,000+ per violation), and facility shutdown orders. Verify your NDT contractor's radiation safety program independently.

Cost Comparison: In-House vs. Contracted NDT

Side-by-side comparison

Component	In-House NDT Program	Contracted NDT Services
Personnel (2 Level II technicians)	\$180,000-\$240,000/yr (salary + benefits)	N/A
Training & certification (initial)	\$15,000-\$25,000 per technician	Included
Continuing education / recertification	\$3,000-\$5,000/yr per technician	Included
Equipment (UT + MT + PT)	\$50,000-\$150,000 (capital)	Included
Equipment calibration & maintenance	\$5,000-\$10,000/yr	Included
Level III support (contracted)	\$25,000-\$50,000/yr	Included
Liability insurance (incremental)	\$10,000-\$20,000/yr	Included
Inspection labor (2,500 hrs @ blended rate)	N/A	\$212,500-\$437,500 (\$85-\$175/hr)
Mobilization costs	N/A	\$10,000-\$50,000/yr
Year 1 Total	\$290,000-\$495,000	\$222,500-\$487,500
Year 2+ Total (no capital)	\$223,000-\$325,000	\$222,500-\$487,500

In-house NDT typically breaks even at 2,000-3,000 hours/year for common methods (UT, MT, PT). Below that, contracting is usually more cost-effective. Specialized methods (PAUT, TOFD, RT, ET) almost always favor contracting due to equipment costs and Level III requirements.

Quick Reference: Common Codes & Standards

Single-page reference card for the most commonly encountered NDT codes

Code / Standard	Scope	NDT Requirements
ASME Section V	NDT methods for ASME code work	Master reference for UT, RT, MT, PT, ET, VT techniques
ASME Section VIII Div. 1	Pressure vessels	Full/spot RT or UT per joint category and UW-11
ASME B31.1	Power piping	RT or UT per Table 136.4
ASME B31.3	Process piping	RT, UT, MT, PT per Table 341.3.2
API 1104	Pipeline welding	RT or UT of girth welds; MT/PT of repairs
API 510	Pressure vessel inspection	UT thickness, MT/PT of repairs, RT as required
API 570	Piping inspection	UT thickness surveys, MT/PT, RT of repairs
API 653	Tank inspection	UT floor scans, MT/PT shell welds
AWS D1.1	Structural steel welding	UT or RT of CJP welds per Clause 6
NAS 410	Aerospace NDT personnel	Personnel qualification standard (replaces MIL-STD-410E)
ASNT SNT-TC-1A	NDT personnel qualification	Recommended practice for employer-based certification
ASNT CP-189	NDT personnel certification	Standard (more prescriptive than SNT-TC-1A)

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1. **Printability matters.** Plant managers and QA directors print these for turnaround planning binders. Avoid large solid color areas on interior pages (waste ink). Reserve full-bleed backgrounds for cover and back cover only. 2. **Tables are the star.** These guides live or die on their reference tables. Make tables scannable, well-spaced, and easy to read at 100% zoom on screen AND when printe

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